GENERAL LIBRARY MAR 11 1918 UNIV. OF MICH. LIBRARY

GAS JOURNAL

LIGHT ✦ HEAT ✦ POWER ✦ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

Vol. CXLI. No. 2851.] LONDON, JANUARY 1, 1918. [70th Year. Price 6d.

O'NEILL'S
OXIDE
GAS PURIFICATION AND CHEMICAL CO., Ltd.
PALMERSTON HOUSE, LONDON, E.C.
Telegrams: "PURIFICATION, LONDON."
Telephone: 9144 London Wall.

PUMPING ENGINES
All Types for ACID, &c.
CAST-IRON OR STEEL TANKS
Any Capacity.
CHEMICAL PLANT.
Roofs and Girders. Structural Work.
SULPHATE OF AMMONIA PLANT
Air and Gas Compressors
MIXERS.
TAR STILLS AND CONDENSERS.
W. NEILL & SON, L[illegible].
Engineers, Iron & Brass Founders,
ST. HELENS JUNCTION.
Telegrams: 'Neill, St. Helens.' Telephone No. 4

PURIFYING MATERIAL
"Brownox-de-Luxe."
Unqualified Satisfaction given where used.
SPENT OXIDE PURCHASED
J. BROWN & CO., Ltd.
Savile Town, DEWSBURY.

TORBAY
JOINT STOPPING
FREE FROM LEAD.
The TORBAY PAINT CO.,
26/28, Billiter St., LONDON, E.C. 3.
39/41, Old Hall St., LIVERPOOL.

"BLUEBELL"
SILICA RETORTS
(95% SILICA)
John G. Stein & Co., Ltd.,
Castlecary, SCOTLAND.

Makers of
GASHOLDERS,
TANKS (C.I. or Steel),
PURIFIERS,
WASHERS,
ROOFS,
&c.
ASHMORE, BENSON, PEASE & CO., LTD.,
STOCKTON-ON-TEES.
Complete GAS WORKS
London Office
82, Victoria Street, Westminster, S.W.
Telegrams: "GASHOLDER."

W. & B. COWAN
(Incorporated in Parkinson and W. & B. Cowan, Ltd.),
LONDON. MANCHESTER. EDINBURGH. GLASGOW.
SYDNEY. MELBOURNE. BRISBANE. WELLINGTON, N.Z.
(See Advertisement on page III. of Wrapper.)

JAMES McKELVIE & CO.
Coal Owners,
Gas and Steam Coal Contractors,
17, RUTLAND SQUARE, EDINBURGH.
59, MARK LANE, LONDON, E.C.
GUILDHALL CHAMBERS, SANDHILL, NEWCASTLE-ON-TYNE.
24, CHAPEL STREET, LIVERPOOL.
ESTABLISHED 1840.

STEWARTS AND LLOYDS, LIMITED, 41, OSWALD STREET, GLASGOW. BROAD STREET CHAMBERS, BIRMINGHAM.
TUBES & FITTINGS for Gas, Steam, Water, &c.

ESTABLISHED — 1861 —
Telegrams: "DRY METERS, LONDON."
Telephone: KENSINGTON, 1140.

George Glover and Co., Ltd.
RANELAGH WORKS
Royal Avenue, Chelsea
LONDON, S.W., 3.

Highest Awards at the Principal International Exhibitions.
Branches at LEEDS (9, Dewsbury Road) and MANCHESTER (Gaythorn Meter Works, Easton St.).

SPECIALISTS IN DRY GAS METERS—SLOT, KEY, AND ORDINARY.
Every meter leaving George Glover and Co.'s works, irrespective of size—and they build up to 3000 Lights—is regulated and tested for soundness at 12 in. pressure, and for registration not only at the ½ in. pressure prescribed by the "Sales of Gas Act," but at 3 in. pressure with full outlet capacity, so as to prevent "slow" registration even when the meter is overworked.
AGENTS FOR THE PATENT M. & M. SELF-LOCKING SLOT METER PADLOCK.

RITCHIE C.I. PIPES FOR GAS & WATER. MIDDLESBROUGH.
H. & J. DEMPSTER, LTD., 84 & 2396 Manchester. & COAL WASHER.

The
WELSBACH
LIGHT CO., LTD.,
is an
All British Company.

All Mantles are
British Made by British
Labour.

Every Mantle manufactured and supplied by the Welsbach Light Co., Ltd., is

BRITISH MADE

by British labour at the Welsbach Factory at Wandsworth, London, S.W. 18.

Welsbach Mantles have stood the test for well over a quarter of a century, and to-day are in greater demand than ever —a proof of their reliability.

THE ORIGINAL AND STILL THE BEST

The **WELSBACH LIGHT CO.** Ltd., Welsbach House, King's Cross, W.C. 1.
And at Birmingham, Bristol, Dublin, Hull, Leeds, Manchester, and Stoke-on-Trent.

GAS EXHAUSTING PLANT.

No. 546.

View of Gas Exhauster combined with "C" Type Horizontal Steam Engine on the same Cast-Iron Baseplate.
This shows one of a standard type of plant supplied by us, where an Exhauster of medium capacity driven by Steam Engine is required.
We have recently introduced a system of Automatic Lubrication, which ensures an Exhauster being continuously and adequately lubricated with a minimum of attention.

Makers also of ROTARY COMPRESSORS for High-Pressure Gas Distribution for pressures up to 20 lbs. per square inch.

VALVES OF ALL TYPES AND SIZES. TAR, LIQUOR, AND WATER PUMPS. COMBINED METER-BLOWERS FOR OXIDE REVIVIFICATION.

THE BRYAN DONKIN CO., Ld., CHESTERFIELD.

Head Offices and Works: CHESTERFIELD.
LONDON OFFICE: MILLBANK HOUSE, Wood Street, WESTMINSTER, S.W. 1.
Chesterfield Telephone No. 84.
London Telephone No. 5358 Victoria.
Chesterfield Telegrams, "Donkin Chesterfield."
London Telegrams, "Donkin, Vic. London."

GAS JOURNAL

LIGHT ✂ HEAT ✂ POWER ✂ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CXLI., No. 2851.] TUESDAY, JANUARY 1, 1918. [70TH YEAR.

EDITORIAL NOTES.

The Outlook.

NEW YEAR'S DAY! And the best we can do, with the world submerged in war, is to hope that the year now lying before us may see victory for the Allied cause, and thereby greater happiness for the human race. With this hope uppermost in mind as we write, the wish is also earnest for all our friends and readers (other than those in the latter category who are not on the side of right, truth, and justice) a happier year than those the rugged paths of which we have of late been treading. But whatever is in store this year, we must all of us, in our own spheres, do our very utmost to carry on, and to help, as far as opportunities allow, to relieve the situation, and to advance the interests of both the national and the industrial causes. Admittedly, the immediate outlook of the gas industry is not the most cheering. The industry is hemmed in on all sides by conditions that are not good to look upon nor to work under; and not much if any relief, other than we hope of a financial character, can be expected until peace is declared. These conditions will have to be borne, no matter how much we dislike them. But we must not permit them to so obsess us that penetration cannot pass beyond. Whatever the nature of the temporary superstructure, the foundations of the gas industry are of a very solid character, and the war has further reinforced them. Therefore, the greater the reason that, however much we are worried by immediate circumstances, time must now be found for preparatory work with the view of utilizing, with the advent of changed conditions, the strong foundations and the large manifested potentialities. It would be folly not to do so. There would be a betrayal of trust by the administrative, the technical, and the commercial men of the industry if they gave way to neglect. We are not of those who would utilize the current abounding worries as an excuse for putting off till the morrow of peace the expenditure of time and labour requisite for the constructive work that must be done to place the industry on the high road to an enlarged life. "Reconstruction" is a term that has never been used or misused so much as during the past year or two. There is no doubtful significance about the expression for the gas industry. It has to reconstruct; and it has pretty good knowledge of the lines that it has to take, unless it desires to be left behind in the shaking-off of the old trammels of tradition and custom, and in the adoption of the new methods necessary to development and more extensive service.

It is not, however, for the gas industry merely a question of pursuing clearly defined lines. There are difficulties in the way. The greatest one is constituted of those who impugn the motives and aims of the industry. These are the defenders of tradition and custom, and therefore the enemies of the industry's progress. We find them among non-gas-works-owning public bodies, and among those who are sticklers for precedent. These have all to be met and dealt with; and there could be no better time than when keenness is being shown in high places for leaving past ways that have been noxious to our national interests, and for adopting those of greater promise and certain effect. It would be a fatal error for the industry to now defer anything that can be regarded as being vital to its future. There has been too much procrastination in past times, too much of the idea of leaving well alone, too much sacrifice made—all because of timidity in meeting the enemy standing in the gate. This will not do. While there has been much delay on the part of the gas industry, competitors have been successfully working to increase their mobility; and their advances have been assisted by the manner in which our own industry has been hanging back from those very developments which the war has insisted are necessary not only for its welfare but for that of the country at large. We need not specify them. They were duly marshalled in the "Retrospect" published last week.

But in one respect, there may be emphasis. The progress of the industry along those lines that are vitally important to it may not only be seriously impeded by not meeting squarely and freely public bodies and precedent worshippers who have hitherto had far too much consideration, but by those advocates of other systems that trespass largely upon land the cultivation of which is essential to the fullest development of the gas industry. We here refer more particularly to the carbonization of coal for the production of fuel and other oils. In the technical and public prints, we now frequently see the Government reproached for not making considerable grants for low-temperature carbonizing plants, in order to augment the production during war time of much-wanted fuel oils. It is pointed out that it is cheaper to put down carbonizing plant than to build tank-steamers; that there is a greater certainty in home production than in crossing the seas; and that in regard to time, home production could, for a like outlay, show a much larger quantity of oil fuel available than carriage by tank-steamers. All of which may be quite true. But the question is whether present and future economy does not suggest that, if the Government desire to spend money in this way, they should see what can be done first through established coal and shale carbonizing industries, by equipping them for a larger production, and, therefore, larger business in the products of carbonization. This is the line of least resistance, and the direction in which utility—present and future—has the greatest existence. With the development of established industries for this special form of national service, subsequent consideration could be given to any development necessary for dealing with cannels the utilization of which the gas industry has almost completely abandoned. The Government has its advisers and its Board of Fuel Research; and it cannot ignore these in favour of newspaper correspondents, most of whom appear to be more or less interested in certain processes. Attacks are made upon the gas industry for putting obstacles in the road of low-temperature carbonization. The only obstacle that it has put has been the protection of its interests by proving the efficiency of its own processes for the purposes for which its products are required.

The gas industry's outlook, relieved of the cloud of war conditions, is good—if there is vigorous prosecution of the campaign for all the freedom and power that are necessary to complete development.

A Study in Generalization.

ONE of the finest compilations of generalizations yet seen is the report of the Coal Conservation Sub-Committee of the Reconstruction Committee on Electric Power Supply in Great Britain. We dealt editorially with an abstract of the document a fortnight since, and last week published the recommendations of the Committee. The full text is now available; and there is not much to add to what has been previously said about it, as it is seen that the cream of the report was contained in the former publication. It is a reassuring thing, however, to find, from a preface to the report, that the important issues raised in it will be explored in all respects by the Government before any action is proposed to Parliament on the subject. This, it is obvious,

is a kind of after-thought, as in the body of the report it is submitted that it is a matter of the greatest national importance that action should be taken "without delay." To carry out the Committee's ideals, practically the whole of the present electrical systems will have to be gradually abandoned, because they find that, with one or two exceptions, the existing power supply undertakings are uneconomical. This is a reflection upon present-day electrical engineers. Even Birmingham, Liverpool, Manchester, and Sheffield are cited as having some uneconomical condition about them, and the power companies are a hindrance to developments. Which, then, are the one or two exceptions? The conditions that exist on the North-East Coast are mentioned as exemplifying how matters electrical can best be served by a comprehensive system; and curiously Mr. Chas. H. Merz, the Vice-Chairman of the Committee, happens to be the Engineer to a group of Companies operating on the North-East Coast. It would be a supreme error, however, to accept such an area, and the fortunate conditions existing there for electricity generation and supply, as being typical of anything that can apply to the less favoured areas of Great Britain.

Among the other generalizations is the statement that it has been settled conclusively that the most economical means of applying power to industry is the electric-motor, which, on account of its high efficiency, has ruled-out all rivals so far as the workshop is concerned; and it is only a question of time for all power to be applied in this way. Such judgment and prognostication do not deviate one whit from what one would expect of a Committee the greater number of the technical men on which are of the electrical persuasion. If it were all true, the gas-engine would stand a poor chance in the future, except as a prime mover. But it happens that conditions alter cases, and that the gas-engine has a scope in which the manufacturer finds it more economical than the electric-motor, and one would rather say that the convenience of the electric-motor under many conditions is superior to its economy. Then there are the rough estimates as to the saving, by adoption of these great schemes of electrical generation and distribution, of 55 million tons of coal out of the 80 millions now expended on power and traction in the country; and with the attendant economies there is calculated to be a final saving of some 100 millions sterling nestling in this scheme of super-stations and high-pressure transmission. There are the bye-products, too! Benefits untold reside in them. The savings and the advantages are cumulative, and they have no end.

The public Press has swallowed the whole of the report; and in certain cases has added something to it. It is the beginning of the regeneration of the country, and the beginning of the end of merely local electricity generation. We are going as a nation to flourish exceedingly through the application of electric power to industry; and in domestic life we are going to have nothing but electric light and electric heating and cooking. The daily Press is unquestionably the most gullible of all creations when it meets with something that it thinks will appeal to the popular taste, and which it does not understand. It does not know that the thermal value of a unit of electricity is only 3420 B.Th.U., which is the thermal value of approximately only 6½ c.ft. of gas. It does not know anything of the expenditure of heat units required to produce the 3420 B.Th.U.; and it does not know that electrical appliances have not an efficiency of 100 p.ct. Thank goodness there is the promise prefacing this report that the issues raised in it are to be explored in all respects by the Government before any action is proposed to Parliament.

Electrical Undertakings Moving towards Coal Carbonization.

As before indicated, some of the technical men of the electrical industry have become tremendously infatuated by the idea of carbonizing the coal employed for steam-raising for the generation of electricity, and obtaining from it gas and secondary products. In this they see a veritable El Dorado, although they have not any very substantial grounds for their assumptions. What the gas industry does through possessing a (given normal times) profitable business for their primary product, does not permit any positive deductions as to what will happen under altogether different conditions. However, it seems to be largely the view in the electricity industry that one of the recommendations that will ultimately be made as the result of the inquiries now proceeding will be that the using of bituminous coal for steam-raising must, in the economic interests of the country, cease once and for all. Then the point will arise as to whether the treatment of the coal shall be carried out by existing carbonizers, or, alternatively, by amalgamating the process and all that it entails with the electricity generating system. It all resolves itself into a question of relative economy, and not for the electricity industry alone. There are others to be considered; and this will involve the question as to whether there will not be sufficient coal carbonized by the gas industry with the developments that are likely to proceed (and this early) to supply through it all the heat units that are required for electricity generation for town supply. Already the gas industry is carbonizing some 18 million tons of coal per annum; and before the war it had a surplus of coke for disposal, which could be gasified or sold for steam-raising purposes direct. The electricity supply industry is using somewhere about 4 million tons of coal annually. Therefore, 8 million tons of coal carbonized at gas-works would give, through coke, the equivalent heat units; and there will without doubt, when we get back to normal working, be a good nucleus of coke available, without developments, to be set against this requirement. However, this line of working would mean the continuance of the best of the existing generating stations, with in time their transfer into contiguity with the larger gas-works in their distribution areas. This appears to be the most economical method of developing upon the existing electrical supply conditions. But if it is considered that the electricity industry should incorporate coal carbonization as an integral part of its system, then this will probably mean large super-stations, expensive transmission, and a greater inroad than is necessary upon the coal resources of the country, seeing that coal must be carbonized for gas production, and coke be yielded as a secondary product.

There are, as was recently pointed out in our columns, electric power companies who are proposing to anticipate coming events, by asking Parliament to bestow the necessary powers upon them for taking up coal carbonizing and manufacturing and treating the secondary products. Now that the Bills are before us, we see that the County of London Electric Supply Company, when in 1913 they had power conferred upon them to purchase a site for a new station at Barking, were not given authorization to carbonize coal and work-up the secondary products. But now they want sanction to "make, produce, work-up, convert, "store, utilize, and deal with any products directly or in- "directly arising in the generation of electricity and any "bye-products of coal and other minerals, and any electro- "chemical, electro-metallurgical, and atmospheric and other "products, and manufacture other products and materials "from any such products as aforesaid, or wholly or partly, "by means thereof, and erect, provide, lay down, main- "tain, and use buildings, machinery, works, plant, appara- "tus, and conveniences, and do all such acts as may be "necessary for making, producing, working-up, converting, "storing, utilizing, and dealing with any such products or "materials as aforesaid." The Gloucestershire Electric Power Company and the Shropshire, Worcestershire, and Staffordshire Electric Power Company are both asking for sanction to "manufacture gas for the purpose of generating "energy," and to "manufacture, produce, work-up, convert, "use, sell, and dispose of any material, products, matters, "and things arising from, or used in the process of the "generation or transformation of energy or power, and any "electro-chemical, electro-metallurgical, and atmospheric "products, and any residual products arising directly or "indirectly from the manufacture of gas by the Company." It will be seen from these quotations that the Companies are proposing to enter very thoroughly into the carbonizing and secondary products business; and it will be for the gas industry to suggest to Parliament that nothing should be done hastily, but that there should be a full technical and commercial inquiry into the alternative schemes of working independently of, or in alliance with, existing carbonizers. At any rate, no harm would be done, seeing that the plan has not been part of the electrical system in the past, by waiting for an expression of opinion and direction from the Board of Fuel Research. Some electrical men are very keen in making a move in this direction; but there is such a thing as being married in haste and repenting at leisure. Better far to be cautious, and to fully appreciate the outcome of what is being done. And this counsel applies as much to the gas industry as to the electricity industry.

The Judgment in the Hackney Appeal.

IN the second bout with the Hackney Borough Council over the preferential charges question for electricity supply, the Gas Light and Coke Company have again lost. The electricity supply industry is jubilant over having obtained this support of the Court of Appeal; but, at the same time, we think its leaders see that the substratum of the case is a very fragile one, in view of the declaration of the Court that the Long Eaton case is distinguishable from the Hackney one, and therefore it stands good as a protection to consumers who take a "corresponding supply" under "similar circumstances." The decision, taken in conjunction with the pronouncement, will make matters worse for the electrical industry in constructing tariffs with inducements attached, inasmuch as the margin in which differentiation can be made between Long Eaton and Hackney is of such a narrow order that any departure from the Hackney tariff will have to be examined by microscopic aid, and tested with mathematical accuracy, to see there is no infringement of the law. We do not know whether the case will be taken to the House of Lords; this is a matter for the Board of the Gas Light and Coke Company to determine. But, if it could be, it would at all events decide the particular preferential charges issue that has arisen in this instance. If the Company require any incentive to do so, perhaps they may find it in the recent case in which the Osram-Robertson Lamp Works finally succeeded in the House of Lords with the action they took against Pope's Electric Lamp Company, Ltd., in regard to the manufacture of electric lamp filaments.

Before proceeding further, there is just one remark we should like to make in regard to a senseless passage that appears in an editorial note in the "Electrician." It asserts that "actions of the present kind are merely "an attempt on the part of the gas industry to thwart "the proper development of the electrical industry." They are certainly nothing of the kind. Electrical men would not think much of the gas industry if it did not, when occasion arose, bestir itself to defend its interests. It is thirty-six years ago since sections 19 and 20 of the Electric Lighting Act were framed for the protection of consumers; and they incidentally gave protection to competitors. Very similar protection is accorded the electricity supply industry in gas legislation. In view of this, the gas industry would be very silly if it did not see that the law was obeyed when its interests were assailed. An attitude of quiet tolerance on its part, no matter the character of the action of the electricity supply industry, would admirably suit the latter.

This Hackney litigation is now old. The point at issue has been described again and again. It is simply this—that the Hackney tariffs include one which enables power users to obtain energy at a fixed charge of £1 per quarter per kilowatt of maximum demand, with an additional charge of ½d. per unit for all energy used. Consumers taking energy under this tariff are allowed to use for lighting, at the power rate, up to 20 p.ct. of the total energy employed for power. This, the Gas Light Company held, was giving a supply for lighting on different terms, instead of on the same terms, to persons taking under similar circumstances a corresponding supply. Thus undue preference was being shown to these power consumers in respect of their lighting requirements. Careful reading of the judgments of the Lords Justices of Appeal does not disclose where there is any defect in the submission of the Gas Company. A great deal was said about "similar circumstances," but little or nothing about "corresponding supply;" and the two things should be taken together. What Hackney has done has been, by some synthetical treatment, to make a combination of two "supplies"—a power supply and a lighting supply—and then contend that the power supply does not correspond to a power supply nor the lighting supply to a lighting supply, because the two things have been cunningly amalgamated, and all correspondence obliterated. It is something with an existence quite its own. The Lords Justices applaud this, and support the Borough Council by some refined discriminations and subtle reasoning which could not have been present in the minds of the framers of the protecting clauses in 1882. The fine-spun arguments in these judgments are, we venture to say, altogether foreign to the considerations that prompted the insertion in the 1882 Act of these provisions as to a sound commercial rule when a supply of current for lighting only was in contemplation. The Hackney Borough Council have sought to establish a new class of "corresponding "supply;" and in ratifying their act, the Court of Appeal remove some of the protection that the ordinary classifications of supply gave to consumers.

However much the use of current for lighting purposes by the power consumer affects detrimentally his load factor (about which there is a little vagueness in the judgments), the fact remains that every unit he takes for lighting at the power rate comes upon the generating station just at the time when it can least afford to supply units at such a rate. There is no proved advantage to the electricity station in this 20 p.ct. consumption for lighting at power rates—the proof anyway cannot be discovered in either the arguments or the judgments. And—although their Lordships appear to have missed the point—the power consumer gets full reward for his power patronage through the price he pays for energy, without offering him a *douceur* in the shape of 20 p.ct. of his power requirements for the purpose of lighting. He is rewarded doubly for his patronage. There is no need for this; and we remain unconvinced that, in respect of lighting consumption, power consumers under this tariff are not obtaining a preference over those whose demand for lighting is of a corresponding order. The Appeal Court was not called upon to interpret the meaning of the terms used in sections 19 and 20 of the Act, but merely to make a pronouncement as to whether the conditions of this particular case violated these sections. That is all, and no more. Other men, other opinions. The case does not finally settle the matter of undue preference in the making of charges for electricity. The Long Eaton judgment stands.

Compulsory and Voluntary Economy in Gas Consumption.

The announcement of the conferment of important new powers upon the Ministry of Munitions in regard to lighting need not cause any additional disturbance of mind. As a matter of fact, the lighting industries are now so familiar with orders and restrictions, that the issue of fresh ones does not seriously affect them, unless they mean further depreciation of their productive resources, which are already down to a critical level These latest powers are permissive, and will only be put into operation where necessity arises for the protection and aid of the output of munitions of war. Compulsion upon gas consumers in respect of a modified use of gas is something which we would rather avoid if possible; but in some areas gas undertakings are now getting close to the conditions where compulsory restriction will have to be resorted to unless consumers voluntarily economize. Appeals have been made for economy in consumption in Birmingham and other places; and the Gas Light and Coke Company have now issued a similar appeal in view of the large increase of demand with a repression on every hand of output resources. Gas heating is one of the lines along which there could be economy if householders would only use rooms in which coke could be employed; for there are now abundant stocks of this commodity available—at all events in the Metropolitan area.

Threepence per Thousand Cubic Feet into the Holder.

Students of gas combustion know that relatively low calorific value gas may, through requiring less air for complete combustion, be in respect of flame temperature of greater advantage to the user than a higher calorific value gas needing a considerable amount of air for complete combustion. That is fairly common knowledge; but there is probably only one engineer in the gas industry who has ever dared to contemplate making a departure from present practices to the length of supplying a gas of only about 350 B.Th.U. That one engineer is Mr. George Helps; and he proposes to save fuel and to produce in the gaseous form a vastly increased bulk of B.Th.U. per ton of coal by mixing with a hydrocarbon gas a diluent—such as Mond gas, producer gas, air, or nitrogen. We should exercise very great discrimination in the choice of the diluent, as there cannot be anything to be gained by dilution with unnecessary incombustibles. Mr. Helps, however, appears to favour in practice the gasifying of all the coke made by producing blue water gas, to get down to the character of gas which he recommends. The first of a series of specifications with Mr. Helps's name attached is published by us this week; and it will be found extremely interesting—for one part because this is not an ordinary specification. There is nothing hard and

dry about it, as is the general character of the class. It tells of the "discovery" of the value of this low calorific value gas; and no new plant or method of manufacture is described. It gives reasons for the merit that lies in the gas; and it shows in tabulated form what can be done in B.Th.U. production by completely gasifying coal. We are promised other specifications which will disclose more as to the aims and intentions of Mr. Helps. Meanwhile, a 350 B.Th.U. gas costing 3d. per 1000 c.ft. in the holder is offered to the gas industry; and therefore an enormous accretion of B.Th.U. for a given price to the consumer is the portrayed improved trading position of the industry. Consumers' appliances would require some adjustment to the new conditions. However, the points in the specification will doubtless undergo much criticism and investigation. But one thing that is transparent from it is that, in Mr. Helps's opinion, the gas industry must be far more venturesome than it has been in the past if it desires to make the best and most profitable use of its opportunities. The 3d. may act as an effectual stimulant.

Figures as to Rating.

The well-known compilation which has for many years now been associated with Preston—having originally been undertaken by Mr. James Carter, and since continued by Mr. W. Allison Davies, his successor in the Borough Treasurership—once again falls to be noticed; and on this occasion, naturally, the influences of the war make themselves manifest to a larger extent than was the case a year ago. There are some slight differences in the towns from which the statistics as to rating, municipal trading, profits and losses, and charges for gas and electricity are collected; but for all practical purposes a comparison can fairly be made with the figures for the preceding twelve months. Of the towns, both large and small, which are included in the statistics, there are this time 38 which are rated at 9s. or more in the pound, as against 32 last year, and 42 for the year before that. In ten instances the rates are over 10s. in the pound (compared with eight for the previous twelve months), while in four they are 11s or more. Only two towns are still rated at 5s. or less in the pound. Turning to the table which shows the rates charged for gas and electricity, proof is found of the fact that prices have not ceased their upward trend. For the past two years, in seven of the towns dealt with the net charge for gas for domestic lighting was 2s. or less per 1000 c.ft.; but this figure has now been reduced to four. Three years ago, 28 places had available domestic supplies of gas on these favourable terms. The section indicating the extent to which the rates in various towns have been relieved by receipts from municipal trading undertakings furnishes the names of three towns in which the amount reaches 1s. in the pound; this being two less than a year ago, and six less than was the case twelve months earlier. On the other hand, there were eight instances in which deficiencies on municipal undertakings resulted in an increase of 1s. or more in the pound to the rates, which is one less than in the previous return. There are no losses shown under the heading of gas; but among the total of 74 cases in which deficiencies were incurred, electric lighting is concerned in 17.

Gas-Cylinders a Public Danger!

Another Committee more or less would not much matter. We would suggest that one should be appointed to report to the Government as to the steps that should be taken to prevent the publication of so much absurdity as is seen to-day in the public Press—especially when dealing with technical matters. "J. O.," writing in the "Westminster Gazette" on the use of gas for motor vehicles, divulges his incompetence to treat of a subject upon which he pretends to speak with some authority. He says that the carrying of "loose" gas in envelopes is not one of the things to commend itself to the engineering expert; and then he proceeds: "If it is to be done at all, it must be in a highly compressed form, which means the use of steel cylinders charged almost to bursting point. I have before alluded to the risks involved by a general adoption of this system; and I welcome the opposition to it by the Government and the Police. However much we may be inconvenienced, this high-compression gas-cylinder business ought to be scotched as an ever-lurking public danger. I say public danger advisedly, because efforts are being made to induce the authorities to permit its use on motor omnibuses. The cylinders it is proposed to use on our public service vehicles are so immense in size that two charges are deemed sufficient for a day's run of a hundred miles or more, and their power is ample enough to wreck a street in the event of an accident. Just imagine the prospect of several thousands of these containers many times larger than a 15-inch projectile, and more destructive, perambulating the streets of London at all hours of the day and night." It would be interesting to learn more of "J. O.'s" notions as to how an explosive mixture is going to find its way into these cylinders, and how ignition is to be brought about in them.

Iron and Steel in the Past Year.

For a long time past, notice has regularly been taken in the pages of the "JOURNAL" of the annual report on the iron and steel and allied trades issued by Messrs. Bolling and Lowe; but on this occasion, for reasons which will be readily appreciated the firm have been obliged to abandon the attempt to give more than a general review of the main factors influencing present-day trade conditions. Government control is, of course, the order of the day in export business at the moment; and they see no early prospect of the grip of this control being relaxed, or, indeed, of a halt being cried to the multiplication of the directions in which it is exercised. In connection with this aspect of the matter, remark is passed on the hardships resulting to merchants from the lack of expert representation on Governmental Trade Committees. But, whatever may be the basis of our national reconstruction after the war, they have no hesitation in saying that no scheme will succeed, or can hope for the approval and co-operation necessary to success, which does not give free scope to the merchants of the community for the exercise of their legitimate functions. While Messrs. Bolling and Lowe experience natural hesitation at the present stage of affairs in regard to indulging in prophecy on the subject of trade conditions after the war, they do assert that, if the old standards are applied, the main determining factors will be shipping facilities and the distribution of the world's food supply. The demands of the home market will be unprecedented, and requirements of the Oversea Dominions and Colonies, and of the Allies, will be on a scale to keep our factories busy; and merchants whose trading facilities are restricted and circumscribed "can render no better service to the national cause than by concentrating all available effort on paving the way now for continuity of industry in our factories after the war."

Coal and Coke Exports.

The exports of coal, coke, and patent fuel for November totalled 2,801,353 tons, which is a reduction of 423,204 tons compared with the corresponding month of 1916, and of 667,949 tons compared with that of 1915. The November value is placed at £3,981,828, which is a reduction of £271,296 upon November, 1916, but an increase upon November, 1915, of £672,296. The value averaged £1 8s. per ton, as compared with £1 6s. 2d. in November, 1916. During the eleven months of last year, the quantity shipped was 35,421,110 tons, compared with 38,375,729 tons in the corresponding period of 1916, and 42,299,908 tons in that of 1915—reductions respectively of 2,954,619 tons and 6,878,798 tons. The value in the eleven months of last year was £47,930,211—an increase of £790,507 on the same period of 1916, and of £12,265,108 on that of 1915. This is the sort of thing that has pleased the coal owners—more income for less business, but will please them less now that they are only to have 5 p.ct. of the excess profits.

Unemployment Insurance.—The Umpire has decided that contributions are payable under the National Insurance (Part II.) (Munition Workers) Act, 1916, in respect of workmen described as valve men, hydraulic main men, tar-main men, and exhauster men engaged wholly or mainly in connection with the operation of bye-product plant attached to coke-ovens; and workmen engaged wholly or mainly in the manufacture, from rubber or rubber proofed fabric, of gas-bags for motor-cars.

German Illuminating Engineering Society.—The eleventh formal meeting of this Society had been fixed for Saturday, the 1st ult., at the Reichsanstalt, Charlottenburg. The programme comprised reports and discussion on the question of the effect of the coal restrictions on lighting. The reporters on different branches of lighting were to be: Gas Lighting, Dr. Bertelsmann, of the Tegel works of the Berlin Corporation gas undertaking; Electric Lighting, Herr Passavant, of Berlin; Petroleum and Candle Lighting, Herr Krey, of Halle.

GAS BILLS FOR 1918.

[FIRST ARTICLE.]

COMMENCEMENT is made to-day with our review of the Gas Bills which have been lodged for the consideration of Parliament in the coming session. More than ordinary interest attaches to most of the measures through the financial question that has arisen owing to the misfitting in many cases of the sliding-scale and maximum prices to present-day conditions. The question of the supply of non-illuminating gas will also arise.

In the Bill of the Aldershot Gas, Water, and District Lighting Company, an extension of the areas of gas and electricity supply is sought, as defined in detail in the first schedule. Additional powers are asked for in regard to the use of lands for gas and secondary products manufacture and electricity generation; and, for the more effective utilization of such lands, power is required to make a level crossing. From the preamble of the Bill, we see that the issued capital now consists of £50,000 of "A" consolidated stock, £10,000 of "B" consolidated stock, £128,901 of "C" consolidated stock, and £182,049 of 4 p.ct. consolidated preference stock. The Company are empowered to raise a further sum of £161,679 by the creation and issue of additional amounts of "C" consolidated stock or of consolidated preference stock. The "A" and "B" consolidated stocks are respectively entitled to standard dividends of 5 and 3½ p.ct. per annum, subject to increase or reduction according as the price for the time being charged by the Company for gas supplied by them is below or above the standard price of 3s. 8d. per 1000 c.ft. The "C" consolidated stock is entitled to a maximum dividend of 5 p.ct. The Company have created and issued 4 p.ct. debenture stock to the nominal amount of £62,125, and have raised by such creation and issue, and by borrowing on mortgage £69.950, and are empowered to raise a further sum of £75,000 by borrowing on mortgage or by creating and issuing debenture stock. The Company seek further capital powers, and, for the purpose of facilitating the raising of money, authorization to issue redeemable preference and debenture stock. Turning to the clauses, it is suggested that, in the proposed extended gas area, the charge for gas shall never be more than 1s. 7d., nor, for a period of seven years from the passing of the Act, less than 1s. per 1000 c.ft. in excess of the price for the time being charged in Aldershot. Regarding the area extensions and the use of lands for gas and secondary products manufacturing and electricity generation, there is nothing more that need be said. In relation to gas traction, we have the provisions whereby the Company desire power to erect or fix and maintain standpipes, pillar pipes, or supply stations connected with their gas-mains in such position as they shall determine, with the approval (which shall not be unreasonably withheld) of the persons under whose control or management the street, road, or public place may be. By means of these standpipes or stations, the Company desire to "supply gas on such terms, and subject to such conditions, as they may think fit for use for the purpose of, or in connection with, mechanically propelled vehicles, or for such other purposes as the Company may from time to time determine." The price charged for any gas supplied under this section is not to be taken into account for the purposes of section 50 [Standard Price and Dividends] of the Act of 1909. Power is also sought to supply independent gas and electricity installations on premises away from the existing mains; but there is a restricting proviso: "Nothing in this section shall authorize the Company to supply electricity within the parish of Aldershot, or to exercise any of the powers of this section with respect to such a supply." There are a number of clauses of a purely domestic character—among them one for the appointment of a managing-director, and others for holding an annual meeting and declaring an interim dividend. As to the additional capital, the Company suggest £300,000, with one-third borrowing powers. The clause to authorize the issue of redeemable preference or redeemable debenture stock follows. [*Parliamentary Agents: Messrs. Dyson & Co.*]

By the Basingstoke Gas Act, 1907, the capital of the Company was consolidated and converted into one class of stock (called "consolidated ordinary stock") of an aggregate amount of £41,050, and entitled to a uniform dividend of 5 p.ct. per annum; and the Company were authorized to raise additional capital not exceeding in the whole (including premiums) £30,000 by the creation and issue of consolidated ordinary stock. The consolidated ordinary stock created and issued, including premiums, now amounts to £51,471; leaving a balance of £19,579 remaining to be issued. By section 28 of the Act of 1907, it was provided that the standard price to be charged by the Company for the supply of gas should be 4s. per 1000 c.ft., with the standard rate of dividend of 5 p.ct. per annum, subject to increase or decrease by 1s. 3d. per half year per cent. in accordance with the decrease or increase of 1d. below or above the standard price in the price for the time being charged. During 1914 and for six years previously, the price charged was 3s. 6d. per 1000 c.ft.; and the Company were accordingly entitled to pay a dividend in respect of each of these years at the rate of 5¾ p.ct. But since the passing of the 1907 Act, they have never paid a dividend exceeding the standard rate of 5 p.ct. per annum. Owing to the abnormal conditions arising out of the present war and beyond the control of the Company, the cost of manufacturing gas has largely increased; and the Company were compelled during 1917 to raise the price of gas to 4s. The cost of manufacturing gas is still increasing, and has rendered it imperative to further raise the price. Therefore, in order to enable the Company to raise additional capital, and to lighten the burden placed upon the undertaking by reason of the present war, it is submitted that it is expedient that the provisions of the Act of 1907 with respect to the dividend payable should be amended. It is proposed that during the continuance of the Act

(1) Section 27 of the Act of 1907 shall be read and have effect as if the standard rate of dividend had been, so far as regards any consolidated stock issued before the 1st day of January, 1918, 5¾ p.ct. per annum; and

(2) Section 28 of the Act of 1907 shall be read and have effect as if the reduction prescribed by that section in the rate of dividend payable by the Company, in respect of each penny or part of a penny by which the standard price is increased, had been 3d. on every £100 of consolidated ordinary stock instead of 1s. 3d., and so in proportion for any fraction of £100.

It is also proposed that any consolidated ordinary stock which the Company may issue after Jan. 1, 1918, and during the continuance of this Act, may, if so provided in a resolution of the Company passed at a special meeting, bear a dividend at a rate not exceeding 6½ p.ct., or such higher rate as the Company with the consent of the Board of Trade may determine; and this rate shall be deemed to be the standard rate of dividend. It is contemplated that these powers (except as to rate of dividend on the additional capital) shall have effect only in respect of the year 1918, and every subsequent half year during the present war and for a period ending June 30 or Dec. 31 (as the case may be) next after the expiration of two years from the termination of the war, or such extended period or periods as the Board of Trade may from time to time direct. [*Parliamentary Agents: Messrs. Torr, Durnford, and Co.*]

The Brentford Gas Company are asking for authority to purchase certain lands for the purpose of constructing additional works, to raise further capital, to amend their powers regarding the price of gas and the payment of dividends, to be relieved from the obligation to supply gas, and to enable the Board of Trade to make Orders in this respect. As to the lands, the Company seek to be empowered to acquire them compulsorily or by agreement; and a clause appears for the protection of the Duke of Devonshire. As to the power to the Board of Trade to grant temporary relief from the obligation to supply gas, it is considered expedient, having regard to the abnormal conditions brought about by, or originating in consequence of, the present war, that provision be made for the issue of an Order by the Board of Trade relieving the Company—during the continuance of the war, and for a period of twelve months from its termination, and such further period as may on the application of the Company be prescribed—from any obligation to give an increased supply to the owner or occupier of any premises, or to give a supply of gas to any premises not previously supplied, and from all claims for damage arising from, and all penalties attached to, the non-fulfilment of, or non-compliance with, any such obligation. As to the sliding-scale of price and dividend, the Company propose the following:

(1) Notwithstanding anything contained in section 23 [Profits of Company Limited] of the Act of 1914, the price charged by the Company for gas in respect of the half year ending the 30th day of June, 1918, and any subsequent half year, shall, for the purpose of carrying into effect the provisions of that section, be deemed to be the price charged in respect of the half year ending the 30th day of June, 1914, with the addition of a sum equal to one-fifth of the amount by which such last-mentioned price is less than the price charged in respect of the half year ending the 30th day of June, 1918, and any subsequent half year respectively.

(2) The provisions of this section shall cease to have any force or effect as from the end of the half year terminating on, or next after, the expiration of a period of twelve months after the termination of the present war, or such longer period (if any) as the Board of Trade may, on the application of the Company, and having regard to any continuance or partial continuance of abnormal conditions due to war, determine by Order made on such terms as the said Board may think fit.

The Company ask for power to raise additional capital to such an amount as shall be sufficient to produce, together with so much of the "B" consolidated stock authorized by the Act of 1914 as has not been issued at the date of the passing of this measure, and after taking into account the premiums or discounts (if any) which may be obtained or allowed respectively on the issue thereof, the sum of £1,200,000, by the creation and issue of further amounts of "B" consolidated stock, or of preference stock, or wholly or partly by one or more of these modes. Also desired is the removal of the limit on the dividend on the preference stock as provided by the Act of 1914, and for freedom to the Directors to fix such rate as they may determine at the time of issue. Authorization is also sought to the raising of money on mortgage or by debenture stock to an amount not exceeding £400,000; the powers to borrow conferred by this section being substituted for the powers to borrow conferred by the previous Acts and Orders. Sanction is also sought to the issue of any authorized capital as redeemable preference stock or debenture stock. [*Parliamentary Agent: Mr. John Kennedy.*]

The Bill which the British Gas Light Company, Limited, have deposited relates to the Norwich Station. By the Acts referring to this station, the capital was limited to £425,000, of which £411,000, or thereabouts, has been spent. Norwich has developed

exceedingly since the Act of 1903 was passed; and in consequence so has the demand for gas. The Company therefore desire to extend their works upon described additional lands adjoining the present works at St. Martin-at-Palace. Sanction is sought to the spending on the undertaking of an additional £400,000, of which the expenditure is suggested of £300,000 as capital stock and £100,000 borrowed money. On the £300,000, it is proposed that the dividend shall not exceed 7½ p.ct. per annum, whether the capital be ordinary or preference, and that the rate of interest upon any sums borrowed on mortgage shall not exceed 6 p.ct. per annum. To the extension of works clause, the Company have appended the "model" residuals clause, which limits their purchasing powers to one-third the quantity of their own production. It is proposed to repeal section 6 of the Norwich Act of 1903, and to obtain authority to charge as part of the costs of the management of the undertaking at Norwich any proportion of the expenses of the chief office in London (including Directors' salaries) not exceeding £2000. It is further contemplated that nothing in preceding measures or the present one shall be deemed to require the Company to hold half-yearly meetings, in conjunction with which provision is made for annual audits, as from July 1 next. There are also clauses referring to the sale of gas in bulk, and to the extension of the limits of supply. [*Parliamentary Agents: Messrs. Sherwood & Co.*]

The Brixham Gas Company supply both gas and electricity. Of the £40,000 of ordinary and preference capital authorized, there only remains £8248 to be issued. The Company have raised by mortgage £2900, and have borrowed from their bankers £8000. It is mentioned in the preamble of the Bill that nearly the whole of the preference capital was sold by auction on the basis of the capital being entitled to a cumulative preference dividend. But no dividend was, in fact, paid on such capital in respect of certain years; and £1412 has been debited to the profit and loss account, and carried to a suspense account for unpaid preference dividends. Now it is submitted that this sum and the profits of the Company available for dividend on the ordinary shares in any year should, as far as may be necessary, be applied to the paying of a dividend on the preference capital in respect of any year or portion of a year for which no dividend or a dividend at less than the rate fixed by the conditions of issue may have been paid on such capital. The clauses first deal with the alteration and extension of the electricity generating station. Then follows the calorific power clause in the usual terms. A minimum pressure of 15-10ths is provided for. The additional capital sought is £8000. On the part issued as ordinary capital it is desired to be entitled to pay 7 p.ct., and on the part issued as preference capital 6 p.ct. Borrowing powers are sought up to one-half the issued capital. Then follow the provision relating to the back-dividends on preference shares, and one as to the issue of redeemable preference shares or stock. Other clauses are of the usual kind. [*Parliamentary Agents: Messrs. Lees & Co.*]

COMMITTEE ON THE CHEMICAL TRADE.

THE Committee who were appointed to advise as to the procedure which should be adopted by the Minister of Reconstruction for dealing with the chemical trade, and to consider any matters affecting the trade which could be more effectively dealt with by the formation of special organizations for the purpose, and make suggestions in regard to the constitution and functions of such organization, have reported to the Minister of Reconstruction (Dr. Addison). The Chairman of the Committee is Sir Keith W. Price and Mr. Charles Carpenter, D.Sc., M.Inst.C.E., is one of the members.

Dealing with the first point of reference, the Committee say it is evident that during the process of reconstruction numerous difficult problems and questions are likely to arise in connection with the chemical trade; and they are of opinion that these can only be satisfactorily settled by the closest collaboration between the Minister and the representatives of the trade. The Minister should be in a position to obtain the views both of the trade as a whole and in the case of particular problems of the branch of the trade directly concerned; and to this end the aid of a representative body is desirable. While certain branches of the industry—among others, sulphate of ammonia manufacturers and tar distillers—are not at present adequately represented on it, it is suggested that the Association of British Chemical Manufacturers is the most representative Association of the chemical trade at present in existence in this country, and that, in dealing with the chemical trade, the Minister could properly act in collaboration with the Association. If, however, it should be necessary to take advice concerning a branch of the trade not adequately represented in the Association, the appropriate Association could be taken into consultation. The Committee are further of opinion that, with a view to convenience of practical working, and in order to establish the permanent link which they are convinced should exist between the Ministry and the trade in all its branches, a Standing Committee should be established fully representative of all the interests concerned.

On the second point of reference, the Committee say that, whatever may be the functions of the Ministry of Reconstruction, it will certainly be necessary to establish a section of the department which will be in a position to deal with matters that may arise in connection with the chemical trade; and they suggest the appointment to the Ministry of a scientific man of good standing (who would command the respect and confidence of the trade), together with the necessary staff. This section, working in conjunction with the Standing Committee, would, in their view, provide an adequate organization for dealing with questions connected with the chemical trade. Some of the duties of the section would be to ascertain, with the assistance of the Standing Committee, the chief problems which are likely to arise in the process of reconstruction after the war, and the best means of dealing with them; to survey generally the chemical trade, both at home and abroad, and in consultation with the Standing Committee to afford advice for the broadening and improvement of the chemical trade of the country; to collect and disseminate information on, and statistics of, the chemical trade; and to collect and collate as much information as is available on the work which has been done during the present war.

The Committee have confined their recommendations within the narrow limits defined by the term "chemical trade." If, however, for this expression were substituted the "national chemical industry," a much broader purview would, they remark, be involved, and specific reference would be necessary to existing organizations other than those specifically founded for trade purposes.

GAS STOCK IN THE PAST YEAR.

GAINS AND LOSSES.

THE ordinary weekly Money Article will be found later on, on p. 36.

GAS COMPANIES.	Prices on Dec. 31, 1916.	Prices on Dec. 29, 1917.	Gain or Loss.
Aldershot	65—70	57—62	—8
Alliance and Dublin, Ordinary	62—64	52—57	—8½
Do. 4 per cent. Deb.	60—65	60—65	..
Bombay, Limited	5—5⅛	5—5⅛	..
Bournemouth, 10 per cent.	25—27	23—25	—2
Do. B 7 per cent.	11—11½	10½—11	—½
Do. Preference 6 per cent.	9½—10	9—9½	—½
Do. Debenture	71—73	67—69	—4
Brentford, Consolidated	85—87	79—82	—5½
Do. New	83—85	76—79	—6½
Do. 5 per cent. Preference	85—90	81—86	—4
Do. 4 per cent. Debenture Stock	67—69	63—65	—4
Brighton and Hove, Original	160—165	145—150	—15
Do. A Ordinary Stock	115—120	98—103	—17
British	34—35	32—33	—2
Do. 4 per cent. Debenture Stock	66—68	66—68	..
Buenos Aires, 4 per cent. Debenture	58—63	51—54	—8
Cape Town and District, Limited	1½—1⅝	3—3⅛	+1⅜
Do. 4½ per cent. Preference	4½—5	6½—7⅛	+2¼
Do. 4½ per cent. Deb. Stock	58—63	58—63	..
Chester 5 per cent. Ordinary	82—83	79—81	—2½
Commercial, 4 per cent. Stock	72—74	70—72	—2
Do. 3½ per cent. do.	68—70	64—66	—4
Do. 3 per cent. Debenture Stock	52—54	52—54	..
Continental Union, Limited	36—38	39—41	+3
Do. 7 per cent. Preference	57—59	61—63	+4
Croydon B and C	175—185	165—175	—10
Derby, Consolidated Stock	100—105	95—100	—5
Do. Debenture Stock	80—83	80—83	..
European, Limited	11—12	10—11	—1
Gaslight and Coke, Ordinary	71—73	67—69	—4
Do. maximum	55—58	56—58	+⅛
Do. Preference	69—71	70—72	+1
Do. Debentures	56—58	54—56	—2
Hastings and St. Leonards	78—83	48—53	—30
Hongkong and China, Limited	8—9	7⅞—8⅛	—⅛
Hornsey	125—135	115—125	—10
Ilford, A and C	112—117	92—97	—20
Do. B	103—108	72 77	—31
Do. Debenture	71—74	63—66	—8
Imperial Continental	72—77	89—92	+16
Do. Debenture	65—67	65—67	..
Lea Bridge	87—92	82—87	—5
Liverpool United	85—87	84½—85	—1½
Do. Debenture	74—76	71—73	—3
Malta and Mediterranean	3¼—4⅛	3⅛—3⅛	—⅛
Metropolitan of Melbourne	89—93	89—100	+3½
Monte Video, Limited	8¼—8⅝	8—8⅛	—⅛
Newcastle and Gateshead	79—80	77⅞—78¼	—1⅝
Do. Debenture	75—77	61—63	—14
North Middlesex	10⅝—11⅛	9⅝—10⅛	—1
Oriental, Limited	104—105	102—104	—2
Ottoman, Limited	2—3	2—3	..
Portsea Island B	95—100	83—88	—12
Do. C	88—93	73—78	—15
Primitiva	2—2¼	1⅞—2	—¼
Do. Preference	3—3⅛	2⅛—3	—⅛
Do. Debenture	78—80	76—78	—2
River Plate	61—67	57—62	—4½
San Paulo, Limited, Preference	8—8⅛	7⅞—8	—⅛
Do. Debenture	43—45	40—42	—3
Sheffield, A.	188—190	180—184	—7
Do. B.			
Do. C.			
South African	..	9—10	..
South Metropolitan, 4 per cent. Ordinary	79—81	75—77	—4
Do. Preference	..	94—96	..
Do. 3 per cent. Deb. Stk.	59—61	55—57	—4
South Shields Consolidated Stock	145—147	137—139	—8
South Suburban, Ordinary 5 per cent. Stk.	80—82	75—77	—5
Do. 5 per cent. Preference Stk.	79—81	75—77	—4
Do. 5 per cent. Debenture Stk.	88—90	84—86	—4
Southampton, Ordinary	77—79	75—77	—2
Tottenham District, A 5 per cent.	120—123	92—97	—27
Do. B 3½ per cent.	90—92	70—72	—20
Do. 4 p.c. Deb. Stk.	65—67	61—63	—4
Tuscan, Limited	1—2	1—2	..
Do. 5 per cent. Deb. Red.	60—65	60—65	..
Tynemouth, 5 per cent. maximum	91—92	89—91	—1½
Wandsworth, Wimbledon and Epsom—			
Wandsworth, A 5 per cent.	117—122	112—117	—5
Do. B 3½ per cent.	101—103	97—99	—4
Do. C 3½ per cent.	88—93	84—89	—4
Wimbledon, 5 per cent.	90—95	85—90	—5
Epsom, 5 per cent.	98—103	93—98	—5
Do. 3 per cent. Debenture Stock	51—54	49—52	—2

OBITUARY.

ALFRED LASS.

THOUGH for a good many years past he had taken but a small part in gas affairs, few men, in his time, were better known in the industry than Mr. Alfred Lass, whose death, on the 21st ult., at Sandown Lodge, Upper Richmond Road, Putney, where he had resided for many years, we have regretfully to record.

By profession an Accountant, he for many years had his offices at No. 30, Gracechurch Street, E.C.—devoting attention particularly to the accounts of gas and water undertakings, and occupying a prominent position in connection with parliamentary proceedings, arbitrations, rating appeals, and matters of this kind. In due course, the late Mr. Samuel Wood became a partner, and then Mr. Ernest W. Drew, who had been with him almost from the commencement. Mr. Lass retired from the firm twenty years ago, after which Messrs. Wood and Drew continued work under the style of Wood, Drew, & Co., until the summer of 1909, when Mr. Wood retired, and Mr. Alfred Moreland joined Mr. Drew, with offices at No. 139, Cannon Street, E.C. Mr. Samuel Wood, it may be added, died last April, as recorded in the "JOURNAL" at the time.

It would be difficult to enumerate the cases in which Mr. Lass and his partners were professionally engaged, for there was scarcely one of any importance in their particular branch with which they were not concerned. It may, however, be stated that they were entrusted with the preparation of the abstracts of the Metropolitan Water Companies' accounts in connection with the arbitration proceedings prior to the acquisition of the undertakings by the Water Board. Work of the same character was Mr. Lass's "Analysis of the Accounts of the Metropolitan Water Companies," which was first published thirty-six years ago, and continued (with the addition, made later, of the accounts of the principal provincial concerns) by Messrs. Wood, Drew, & Co., until the war necessitated its temporary cessation.

As for our own industry, it may be mentioned that Mr. Lass was associated with the Barnet District Gas and Water Company from its incorporation in 1872, having been appointed one of the Auditors. A year later he became Accountant to the Company, and in 1875 succeeded Mr. W. C. Humphrys as Secretary, a position which he filled until early in 1899, when continued ill-health compelled him to relinquish it. He was, however, elected as a Director, in which capacity he was present at the meeting of shareholders last August. He was also Secretary of the Riddings District Gas Company from 1888 (the date of its incorporation) until 1897; and in this position, as well as in the secretaryship of the Barnet Company, he was succeeded by Mr. Drew, the present holder. Near about this time, Mr. Lass resigned his appointment as one of the Auditors of the Crystal Palace District (now the South Suburban) Gas Company. For twenty-one years he was Chairman of the Chichester Gas Company; but in 1911 the state of his health forced him to resign this, and he retired from the Board.

In 1878, Mr. Lass was elected an Auditor of the British Association of Gas Managers; and he held office under the Institute until 1900 (when his partner, Mr. Wood, was appointed), and he was made an honorary member. At the meeting in the year before his election he read a paper, entitled: "Is the Adoption of the Form of Accounts Scheduled in the Gas-Works Clauses Act, 1871, by all Gas Companies or Corporations Desirable?" He was the coadjutor of the late Mr. Magnus Ohren in the audit of the accounts of the first Institution of Gas Engineers; and he was a regular attendant at the meetings of both organizations. On the death of Mr. W. H. Bennett, in 1883, he succeeded him as Auditor to the Society of Engineers; and he was subsequently joined by Mr. Wood. They were Hon. Auditors till Mr. Lass's retirement. Another paper read by Mr. Lass—this time before the Chartered Accountant Students' Society in London—was on the "Accounts of Gas Companies, Especially in Relation to the Reserve, Insurance, Sinking, and Depreciation Funds." Attention was subsequently called by Mr. H. E. Jones, in a letter to the "JOURNAL," to Mr. Lass's remarks on income-tax allowance for depreciation; and they were considered so appropriate to the discussion then going on that they were reproduced.

Mr. Lass, who was in his 84th year at the time of his death, was married twice, and by his first wife had an only daughter, who is the widow of Mr. C. W. Boyns, the late Secretary of the Romford Gas Company.

Our French colleagues in the gas industry have to deplore the death, after a very short illness, of an old and respected member in the person of M. JACQUES MONTHIERS. M. Monthiers, who was born in 1861, qualified as a gas engineer under his grandfather, M. Gabriel Dehaynin, whom he succeeded, in 1887, as the Manager of the Compagnie Française de l'Eclairage et de Chauffage par le Gaz. He was one of the founders of the French Professional Gas Syndicate, and in the latter part of his life was a Director of several companies—including that of St. Etienne and the General Belgian Company.

Recent issues of the "Journal für Gasbeleuchtung" have reported the following deaths among men connected with the gas industry in Germany: Suddenly on Oct. 23, Herr JOHANNES KLEIN, the founder and manager of the Engineering and Fittings works of Klein, Schanzlin, and Becker, of Frankenthal. Herr Klein was an active member of the German Association of Gas and Water Engineers, and a regular contributor to the "Journal für Gasbeleuchtung." Dr. OSKAR KNUBLAUCH, of Ehrenfeld, near Cologne, was a well-known gas chemist, and a contributor of forty years' standing to the same paper. Abstracts of communications by him—especially on the extraction and determination of cyanogen compounds—have frequently appeared in the pages of the "JOURNAL." He had attained his sixty-ninth year. Herr HEINRICH VIEHOFF died on Nov. 1. He was born in 1842, and was first engaged at the Chemnitz Gas-Works, and then managed the gas-works at Kempen on the Lower Rhine. From 1874 to 1913, he was Manager of the Saargemünd Gas-Works—retiring in the latter year with a pension. Herr EMIL WEBER, who died Oct. 17, had since 1890 been Manager of the gas-works of Eisenach, and had been responsible for the erection of the new gas-works there in 1898. Herr Webber was born in 1859.

PERSONAL.

The Gas and Water Committee of the Devizes Corporation have advanced by £50 per annum the salary of Mr. W. J. RENDELL BAKER, the Engineer and Manager.

Mr. P. J. WALSH, of the Clonmel Gas-Works, has been presented with a handsome watch by his friends in the town, on his appointment as Manager of the Kilrush (co. Clare) Gas-Works.

Much sympathy will be felt by her many friends in the gas industry with Mrs. W. E. PRICE, of Hampton Wick, who is suffering from the effects of a bad cycling accident, sustained on the 21st ult. As the result of a side-slip, she was thrown under an army motor wagon, and was removed to the Kingston Hospital in a serious condition. Her face was very much hurt, and her shoulder dislocated; but fortunately neither her head nor her body was injured. The latest report is, we are pleased to say, that Mrs. Price is progressing (though slowly), and is distinctly better.

Mr. W. R. Herring has been officially informed that his son, Private RALPH AUSTIN HERRING, 14th Battalion of the London Regiment, was posted as missing on Nov. 24. He has been at the front nearly eighteen months, and arrived home on leave the day after his 21st birthday—only getting back to his comrades on Nov. 23. Up to the present there is no further news, and readers will share in the hope that he may have been made prisoner. Private Herring was wounded in the foot on Nov. 24, and had the injury dressed; but before he could be carried away, the enemy made a counter attack, and penetrated the portion of the trench where he was sitting. His friends had to leave him, to take part in the fighting, and did not see him again, but hoped that he might have been able to get away.

Mr. HAROLD SHEWRING (who is a nephew of Mr. F. Shewring, the Engineer of the Tawe Valley Gas Company), has been appointed as Second Assistant at the Warrington Corporation Gas-Works—a position which was recently advertised in the "JOURNAL." He was a pupil at the West Bromwich Gas-Works, under Mr. Harold E. Copp, and remained there as an Assistant until the outbreak of the war, when he joined up. He rose to the rank of Captain of the 11th Royal Warwicks, and spent two years in France. On two occasions he was mentioned in dispatches, and was wounded in 1916. Recovering, however, he went back to his regiment in France, and was gazetted out of the army only three weeks or so ago. Mr. Shewring has passed the following examinations: University of Birmingham, Matriculation first class; University of London, Matriculation second class; University of London, Intermediate B.Sc. (Engineering); City and Guilds of London, Gas Engineering and Gas Supply, both first class final grade; also Building Construction, &c.

Rolled British Standard Sections.—The Controller's Department, Admiralty, Great George Street, S.W. 1, have issued a list of steel sections (angles, bulb angles, channels, bulb plates, tee bars, and joists), which has been adopted, after conferences between the Admiralty and Ministry of Munitions, as sufficing to cover all practical requirements for the duration of the war. It is pointed out that it is desirable that information as to these sections should be generally known, in view of the fact that there is little or no prospect of any other sections being available for the present. All designers and consumers will, therefore, do well to base their requirements on this list, with a view to the avoidance of disappointment and delay.

Award for Science Research.—Lord Rathdonnel presided at a scientific meeting of the Royal Dublin Society, at which the Boyle Medal was presented to Prof. J. A. M'Clelland, F.R.S., a member of the Advisory Committee on Industrial Research, for his work in research in many branches of science, but primarily in those which deal with ionization as resulting from additions of electrons to gaseous molecules, or aggregates of such, and with the more recently discovered forms of radiation associated with radio-activity. The report of the Committee making the recommendation of the award stated that Prof. M'Clelland's work on ionization had been used by Sir J. J. Thomson in his work on conductivity through gases, and that his discoveries on secondary radiations had been the starting-point of much similar work done, not only in England, but abroad.

ELECTRICITY SUPPLY MEMORANDA.

REVIEW OF THE PAST YEAR.

THE distinguishing features of the past year for the electricity supply industry have been the extensive discussions and inquiries which, it is hoped, will have their upshot in constructive work to give the industry a more solid foundation, and an immense appreciation of economic conditions. The words that have flowed on the subject have been of a copious order; but as yet there is little result within sight. It looks as though the time is still distant when there will be any concrete issue; and when it does come it will, in all probability, be through the departmental inquiries that are being made. Among all the plans that have been discussed, we have not recognized a new idea. They are the old ones resuscitated, picked out and packed together in manner just as harmonizes with the views of those who do the picking and the packing. In the industry there are no unanimous views on the subject—some think one way, some another; and the arbitrators will probably be the Board of Trade Committee on Power Supply, with the Board of Fuel Research bringing some influence to bear in a way that a Committee of such an incongruous composition as the one appointed by the Board of Trade cannot do, or rather are not capable of doing. And for the reason that there are upon it experts of known set and opposing opinions, while the rest are mostly laymen who know as much about how to use a ton of coal to the best advantage as the man in the moon; and so are there to help to deliver judgment! The war has made many of the professional men of the industry jump in a direction to which in pre-war times they gave little heed. They have become conscience stricken. With all their boasted scientific education, they have been thoughtlessly shovelling coal under boilers, having only in view the raising of steam, and thinking nothing of the destruction of which they were guilty. They have seen the gas industry step in as the saviour of the country through the provision of those high explosives of which, through prior neglect, the Army and the Navy stood so much in need at the beginning of the war. They have seen the gas industry busy providing fuel oils; and they have seen it supplying the fertilizer so much required to make the earth yield her increase in these times when the country has to be more self-dependent. All the time, too, they have been observing the very substantial part the gas industry has been taking in supplying factories with light, heat, and power for munitions work; and they have read with amazement of the immense outputs of gas on cold days for domestic heating.

PLAUSIBLE SCHEMES.

Electrical technical men realize now more than ever through the object-lessons vouchsafed them by the war that there have been shortcomings on their part, and now they have to carbonize the millions of tons of coal used for steam-raising and generating electricity, and also be producers of secondary products. Some of them are so accustomed to only looking at one mode of doing a thing that, having got this plan in mind, they cannot conceive that there is any other that may be, in the interests of national economy, a better way. They want super-stations, with immense coal carbonizing and secondary product plants prefacing the electricity generating part. They wish these stations to be situated as near colliery areas as the provision of an ample water supply will permit, with transmission at high voltages of the electricity about the country by overhead cables; and they assert the right in the interests of the country to an open door in the matter of wayleaves. Some of the more enthusiastic ones would compel local authorities to draw from these supplies in preference to extending their own stations. There are also those extremists who, in the interests of big load and diversity factors, would make it compulsory upon manufacturers and domestic consumers to use current generated at the gigantic super-stations. The interests of the electricity industry must be served though other industries thereby sink. It is one of the most selfish of industries. But the Board of Fuel Research have uttered some economic truths in regard to which the electrical industry is not well pleased. Of low-temperature carbonization (which has attractions for some electrical engineers), the Board have pointed out that, if new schemes cannot live without poaching upon the territory of other industries, they are not justified. They also referred to carbonization and electricity generation, and to the "plausible statements" met with in relation thereto. The "plausible statements" are fixtures in the minds of those who have made them without the slightest qualification for investigation to ascertain the intrinsic value of the notions. Even in the matter of transmission, "D. V. M." showed in the "Electrical Times" that the technical men of the electrical industry have no certain ground for supposing that transmission of electrical current over long distances is any cheaper than transmitting gas by pipes or coal by railway wagon. At the same time, the Coal Conservation Sub-Committee of the Reconstruction Committee pointed to the startling savings that the super-station would effect, which savings electrical engineers must have taken with a grain of salt. This is not to be wondered at. A saving of 55 million tons of coal out of the 80 millions used in the country for power purposes—this saving through the magic influence of electricity—is asking too much of men's intelligence. The same Committee propose that the country shall be divided up into sixteen areas, each under one authority—a company or a board—and the whole under the control of a Central Board of Commissioners. This means only sixteen chief engineers, with assistants; and the present company and municipal engineers reduced to local distributors and salesmen. Without the Board of Fuel Research bring some influence to bear, the Board of Trade Committee may in their recommendations follow much on the lines of the Coal Conservation Committee.

MUNICIPAL FEARS.

From all this municipal authorities are rather dreading some attempt to usurp their administrative functions. When the first constitution of the Board of Trade Committee was seen, this view obtained quick circulation and acceptance, and caused much uneasiness. The appointment of the Committee met with a chilly reception; and the President of the Board of Trade found the local authorities persistent in trying for some better representation When they got an improvement in this respect, it was still regarded as unsatisfactory—in fact, they have never been satisfied, and are very jumpy as to the future. In interlinking schemes, too they see what they did not see at first—the thin end of the wedge to combined operation, and death to individual administration in respect to electrical generation. Some of the electric power companies are anticipating happenings in this direction, and are trying to be first in the field by asking Parliament at once for powers to incorporate coal carbonization and gas and secondary products manufacture in their operations. Interlinking has taken a firm hold of many technical electrical men, as being the proper course to pursue in achieving the ultimate materialization of the super-station. There have been a few cases of undertakings interlinking. But the big thing of the year in this connection was the issue of the second report on the question by the Lancashire and Cheshire Committee. They estimate that, by an expenditure of £281,000 on interconnection mains between the undertakings in the two counties, with transformer plant, there will be a saving of coal equal to £82,000 a year, with coal at 17s. 6d. per ton, simply and solely through the more efficient use of the plant. Their views did not end at interlinking; they too have visions of a Board and super-generating stations. But the masters of the technical men—the town councillors—are not at all favourable to this extension of interlinking, as it means an infringement and loss of local rights. The super-station, however, cannot really claim unanimous advocacy. Mr. E. M. Lacey put a "spoke in the wheel" of the super-station men when he showed that at Walsall, by the adoption of special devices in design and types of plant, in the relatively small power station there, he had reached a cost per kilowatt that is the lowest of any station yet erected in this country. He gave his operating expenses—including coal at 12s. per ton, water, waste, &c., wages, repairs and maintenance, management, and rent, rates, and taxes—as 0·224d. per kilowatt-hour; the fixed charges bringing up the total to 0·29d. The cost of the 12,000 KW. station, at 1914 prices, worked out to approximately £6 12s. per kilowatt, which is very low.

WORKING ALLIANCE WITH THE GAS INDUSTRY.

But while all this is going on, doubts are gradually but surely arising in the minds of some technical men as to whether the final result will be exactly that contemplated—more especially in connection with coal carbonization and bye-product manufacture and the cost of transmission; and there are some thinkers among them who are of opinion that the beginning of more economical conditions, not only for the electricity industry, but for the nation at large, centres in the existing coal-carbonizing industries. But there is not much hope for the electrical industry from the owners of coking plants at collieries and at iron and steel works, as the internal developments of these industries presage the home utilization of all their own resources for power and heating purposes. It is therefore considered by the President of the Institution of Electrical Engineers (Mr. C. H. Wordingham) that there should be, in respect of fuel supply, a closer alliance with the gas industry, seeing that its business in all products is established with all the ramifications that their variety demands. He is hoping to see his views become a reality in association with a scheme for a new station at Leicester, where he is the Consulting Engineer. Mr. E. W. L. Nicol, the expert of the London Coke Sales Committee, too, sees economy in the incorporation with gas-works plant of steam-raising for electricity generation, by utilizing the heat of the coke in the furnaces of steam-boilers direct on its discharge from gas-retorts. Whether anything will come from this cannot be said, as electrical engineers are rather jealous of keeping the whole of their operations in their own hands. There appears to be a tendency among them to favour the gas-firing of boilers. There are sceptics; but at the same time it is thought to be the coming thing. Granting this is so, then the place for the generation of a gas, with ammonia recovery, is at gas-works, by the utilization of coke for the purpose. The National Gas Council Utilization of Fuel Resources Committee have had many meetings with scientists and electrical authorities who are strongly in favour of co-operation and joint working between the gas and electricity industries on the lines of the former supplying the latter with heat units. Who, then, can say what developments are in store in this relation?

INCREASES OF CHARGE AND DEFICITS OF PROFIT.

Like the gas industry, the electricity industry has suffered from the considerable advances in the cost of fuel, materials, and

labour—in fact, every outgoing has during the war period mounted up with the greatest alacrity. It has also, in common with other coal users, had to pay the higher prices for coal containing large percentages of inert material, through the absence of picking at the pits. This has been a serious uneconomy. It has affected the efficiency of the steam-raising plant, and has augmented the labour for clinkering and ash removal. Under the circumstances, prices for current have had to be increased largely. There are cases of as much as 50 p.ct. additions to pre-war prices. Some administrators have very wisely taken advantage of the opportunity of simplifying their tariffs, which, in truth, contained many illustrations of having been wonderfully and fearfully constructed—so much so that consumers were always in perplexity as to their meaning. The power and heating charges of pre-war times, having about them no margin of flesh, have also had to undergo revision, where contracts did not hinder. Where they have done so, there has been resolution that prudence shall see a protective clause inserted in future contracts. There have, in the case of many municipal concerns—more than usual in view of war conditions—been large deficits, which show that the users of the energy have not been paying sufficient to meet the costs of their supply; and therefore the ratepayers generally, whether or not electricity consumers, have been compelled to make good the deficiency, which, in view of the fact that they have to meet their own obligations, is hard on them, and is a dishonest proceeding. Gas and electricity companies have to work without any such outside aid. Protest was lodged against this procedure by the South Suburban Gas Company in the case of the Beckenham District Council undertaking; and the suggestion was made that the Local Government Board should be asked to allow the postponement of the redemption fund during the period of the war, in order to avoid the placing of the burden of deficit upon the rates. To this the Board would not accede; but they intimated that the proper course was to charge sufficient to make the business pay for itself. This, however, did not meet with the approval of the Council. In the case of those local authorities who look for profit in aid of the rates, they saw the balances vanishing, and took steps to try to adjust matters by raising the charges. But they have not consistently succeeded in placing them sufficiently high to realize their aim. Very properly the Lancashire and Cheshire Committee on Interlinking, in their second report, expressed the opinion that the practice of making profits for handing over substantial grants to the local rates is detrimental to the adequate and economical supply of electricity.

Wiring and a Guarantee Scheme.

Electrocutions, failures, and fires continued during the year to attest the need for extensive rules and regulations, though a strict observance of these does not ensure immunity from trouble. The issue by the Bureau of Standards of America of a National Electrical Safety Code of some 323 pages caused electrical comment this side on the gross evidence that this afforded of the need of highly refined attention to all the details of electrical equipment, in order to give protection to users so far as human ingenuity would allow. But the most famed electrical contractors have to acknowledge that electricity has at some time or other defeated their care and precautions. There are contractors who are not cautious, and who compete for business on cheap lines, which means indifferent material and execution of work. The Electrical Contractors' Association have for five years been considering how best to remove this bane of electricity supply. They have now formed what is known as "N.E.C.T.A., Ltd.," through which they are putting into operation an installation guarantee and inspection scheme. The guarantee does not exceed £50, and the time limit is six months. The scheme suffers in its effectiveness and efficiency from these economical limitations.

Business Prospective and Current.

Except for munition purposes, the electricity supply business has been repressed precisely as has been that of the gas industry in the matter of the supply of materials and labour. Restrictions, priority certificates, and the rest are as well known to the electrical engineer as to the gas engineer; and therefore developments in business have been mostly in connection with power supply for munition factories. Even in the power line (so one electrical writer has stated) the progress made has been slow, though the stimulus of war demands has proved how wide is the field left untouched. There is confidence among electrical men that the power field is altogether destined for them. They forget to look around them, and to ascertain the trend of affairs in the gas industry towards the production of a cheaper power and heating gas; and they have failed to observe the movements in relation to gas-engine developments. However, they are gazing ahead for a big industrial business expansion after the war—not only in power, but in the utilization of the electric-furnace for steel production, a need for which is cheaper energy. They also hope for much more from electric vehicles; from the driving of agricultural machinery by electrical energy; and from electroculture. There are doubts as to the last-named. The use of electricity in this direction is only for stimulating purposes when the sun's rays are not available. Fertilizers will still be needed. Some scientists are now questioning whether there are beneficial physiological effects from the use of electricity for forcing growths. This remains to be proved.

In respect of lighting, there has been stagnation. The conditions as to restrictions, materials, and labour are not favourable to developments. There are claims that domestic heating has made good advance. If this is so, it is due to the difficulties of householders over solid fuel supplies, and to the impossibility in some districts of keeping pace with the demands for gas-fires. So far as the capability exists, the electric fire picks up the "crumbs" that fall from the tables of more economical heating systems. In some areas electric current for heating has gone up to 2d. 2½d., and perhaps in instances more per unit; and to utilize electricity for heating under such circumstances is not an economy to the householder. As to cooking by electricity, the aged exaggerated claims have continued to be made; and references to recent notes in the "Memoranda" will show this, as well as our criticisms. The *status quo* of water heating by electricity has been maintained. In other words, it still occupies the position of being a standing joke; and it cannot possibly escape from the meshes of the effectual net thrown round it by the unit of electricity having a thermal value of only 3420 B.Th.U.

Legal and Parliamentary.

Concluding these sketchy notes reviewing the electrical features of the year, it may be mentioned that the Hackney preferential charges case has gone against the Gas Light and Coke Company. We need not make any extended reference to the matter here, as comment appears in our editorial columns. But the case has a very limited value to the electricity industry, inasmuch as it has been removed entirely from having any identity with the Long Eaton one. It was amusing to witness the strenuous efforts that were made by the Hackney Electricity Department and its supporters to obtain subscriptions of money from other undertakings with which to liquidate the costs of the action; and this despite the fact that the Local Government Board, in answer to an inquiry, stated that they were not aware of any legal authority enabling local councils to make such contributions as this, and so the Board did not think they could properly undertake to sanction expenditure of the kind. As to parliamentary matters, during the year it was gathered from the annual report of the British Electrical and Allied Manufacturers' Association that they were co-operating with the Association of Power Companies in drafting a new Electric Bill. Last session there were comparatively few Electric Bills and Provisional Orders claiming the attention of Parliament or the Board of Trade. A feature was provided by the Electrical Distribution of Yorkshire, Limited, who set seriously to work to enlarge their sphere of operations by the promotion of a number of separate Orders.

We will leave at this the review of things electrical in 1917. From what is said, those gas men who interest themselves in the affairs of their chief competitor will see that it is hoping to get on to a higher level of generating and supply economy which will enhance its commercial power, and that it hopes thereby to greatly enlarge its sphere of trading. These facts should stimulate even those gas men who take no thought for the morrow, and live in an atmosphere of supreme content (which is an enemy to progress and safety) so far as their competitor goes—only grumbling over the current circumstances which have disturbed the peacefulness of their ways.

The Value of an Experimental Room.

The benefits which he believes would accrue to foremen from the provision of an experimental room for their use were set forth by Mr. Hogg, in a paper he contributed recently to the proceedings of the Glasgow Gas Department Foremen's Association. In the first place, he said, it would enable them to definitely ascertain the hourly consumption of various sizes and makes of fires, radiators, geysers, circulators, cookers, range fittings, grills, and rings, determined at an average pressure—thus enabling them to calculate the exact cost. Then if a foreman had an idea which might ultimately prove to be of some use to the gas industry, he would have a chance to experiment and bring his plan to fruition. A calorimeter and a photometer might be placed at their disposal; and all the latest appliances, as they appeared, could be brought to the room, and so permit the foremen to become at once acquainted with them. Such a room would be a continual source of enlightenment and education to them. Suggesting that the principle of paying a bonus on sales might be well worth adopting, Mr. Hogg said a foreman might make a call at the request of a consumer, and be told the lighting was so bad that he had better remove the meter, to allow electricity to be introduced. While they recognized it was their duty to prevent this taking place, would not some such scheme be a great incentive to them to do all in their power to persuade the consumer as to the advisability of installing the latest type of gas-lamp? The plan might even be extended to appliances on hire or hire-purchase.

French Retort Graphite.—The production in France of retort graphite being entirely reserved for certain controlled manufactures nominated by the Metallurgical Branch of the French Ministry of Munitions, the price of the commodity has recently been fixed at £12 16s. per tonne.

TANK AND GASHOLDER AT THE TOTTENHAM LIGHT, HEAT, AND POWER COMPANY'S WORKS.

MR. ARTHUR E. BROADBERRY, M.INST.C.E., CHIEF ENGINEER.

[Our Contemporary, "Engineering," have published a fully illustrated article on this subject. We have received special permission to reproduce it, together with the illustrations which have been courteously placed at our disposal.—Ed. G.J.]

We illustrate to-day the five-lift 6,750,000 c.ft. gasholder which the Tottenham Light, Heat, and Power Company are to erect to complete the new extension of their plant. The holder was designed by the Company's Chief Engineer, Mr. A. E. Broadberry, M.Inst.C.E.

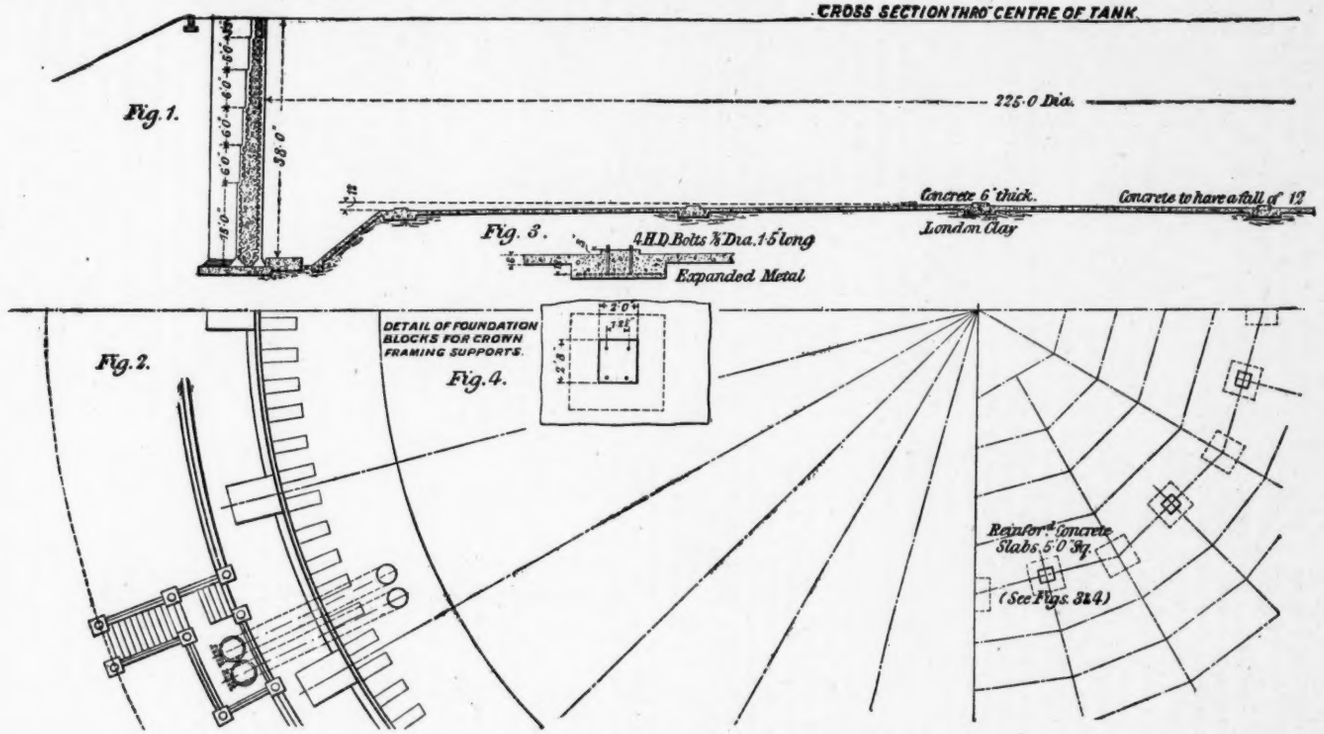

CROSS SECTION THRO' CENTRE OF TANK.
225·0 Dia.
38·0
Concrete 6" thick.
Concrete to have a fall of 1"
London Clay
4 H.D. Bolts ¾" Dia. 1·5" long
Expanded Metal
DETAIL OF FOUNDATION BLOCKS FOR CROWN FRAMING SUPPORTS.
Reinforced Concrete Slabs. 5·0 Sq.
(See Figs. 3 & 4)

Fig. 1.

Fig. 3.

Fig. 2.

Fig. 4.

THE CONSTRUCTION OF THE TANK.

The brick tank, of which views are given in figs. 1 and 2, has already been constructed by Messrs. R. Robinson and Co., of Queen Anne's Chambers, Westminster. It was commenced in September, 1913, and was completed the following year. It has a diameter of 225 ft., and a depth of 39 ft. 3 in. from coping to floor. The wall and piers for the gasholder standards are 6 to 1 Portland cement concrete, and are faced with brickwork. Bands of "Exmet" (manufactured by the Expanded Metal Company) were inserted as reinforcement at intervals of 2 ft. in the depth of the walls and of the piers. The brick facing is of 4½-in. work; every fourth course in height being a header, for the purpose of bonding with the concrete. The wall is carried up 10 ft. above the surrounding ground level; and the coping is of blue Staffordshire bull-nosed bricks. Mr. Broadberry's reason for keeping the coping at this high level was to ensure, as far as possible, that the trench excavation, at its maximum depth of 40 ft., should not pierce similar faults in the clay to those experienced on other excavation work which had been carried out in the neighbourhood.

The annular trench for the wall, piers, and 36-in. inlet and outlet pipes, varying from 10 ft. to 25 ft. in width, passed through about 7 ft. of light soil and peat, 15 ft. of clean gravel or ballast, and 14 ft. of clay. The trench was timbered with 3-in. runners, 4-in. and 6-in. walings, and 10-in. to 12-in. struts. For the lower frames, in the clay, poling-boards were substituted for the runners. The wall was backed with 24 in. of puddle from clay excavated from the trench and passed through a pug-mill. Two large sumps, with cross trenches, were sunk slightly in advance of the main trench. The flow of water from the gravel to these sumps, and to the main trench, was so considerable as to necessitate the keeping fully running day and night of a 9-in. and a 6-in. centrifugal pump, a 14-in. rocker pump, and several Pulsometers. Difficulty was experienced, through pockets and the uneven surface levels of the clay, in preventing rushes of water on to the puddle and wall while the work progressed.

The material from the trench excavation was filled into handcarts, which were hoisted away by steam-cranes in the usual manner. This system of working by handcarts is believed to be novel. The handcarts, after filling, were run on rails right up to the side of the wall, were hoisted away, and tipped direct where required for the formation of the embankment surrounding the wall. By this means, the necessity for filling, emptying, refilling, and tipping is avoided, and the work is carried out more expeditiously than would be the case by the usual methods of working. The surplus material, with the exception of the ballast, of which there was a very large quantity, was run to spoil and, as before stated, used in forming the embankment.

The bricks used, 500,000 in number, were manufactured locally.

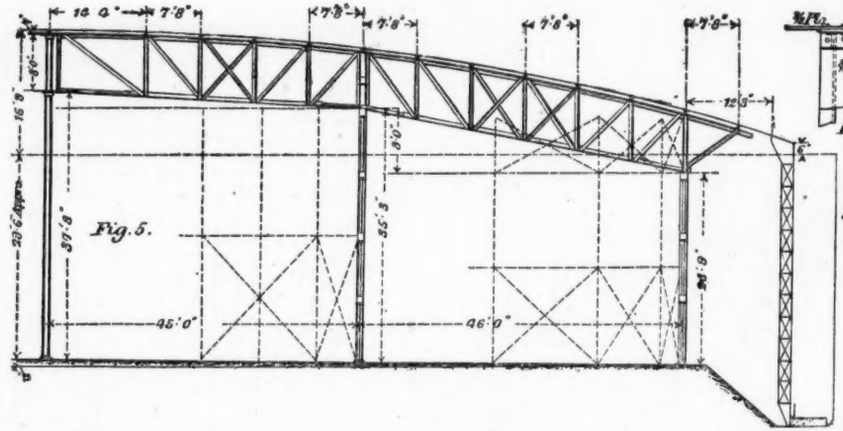
The concrete (4700 cub. yds. were needed) was made of ballast from the site. The capacity of the trench excavation was 10,500 cub. yds., and of the general excavation 31,000 cub. yds. Of timbering, 53,000 ft. super. were employed; and there were 3500 cub. yds. of puddle. The capacity of the tank, not including the dumpling, is 1,560,614 cub. ft.; and multiplying by 6·25 gives 9,753,837 as the capacity in gallons of water required.

For testing, the holder will be filled with air until the air blows out under the curb. The holder will then be lowered 3 ft., the blower shut off, and the holder must prove itself airtight during a period of three days—allowance, of course, being made in testing for atmospheric variations.

The construction of the holder is to include the

The construction of the holder is to include the erection of the framing in the tank for supporting the crown, and also of the tank guides (figs. 5 to 13). The crown framing will consist of rows of purlins of rolled steel joists (figs. 5 and 6) carried on twelve girders radiating from the centre, and twenty-four girders forming an outer ring also radiating from the centre. The girders will be supported by two rings of stanchions braced together, and one centre stanchion. There will be twelve rows or rings of purlins of 7 in. by 4 in. by 16 lb. rolled steel joists spaced 7 ft. 6 in. apart. The purlins will be bolted to the girders by two $\frac{3}{4}$-in. bolts at each end, and will be connected together by a pair of fishplates 6 in. by $\frac{1}{4}$ in. by 9 in., bent to the proper angle at each joint. Four $\frac{3}{4}$-in. bolts will be used for each bar of fishplates. The twelve girders radiating from the centre will be 8 ft. deep and about 45 ft. long. The top member will be formed of two angles, 3 in. by 3 in. by $\frac{3}{8}$ in.; the bottom member will be one flat bar, 4 in. by $\frac{5}{8}$ in., with an extension at each end of the two angles, 3 in. by 3 in. by $\frac{3}{8}$ in. The struts will be formed of 3 in. by 3 in. by $\frac{3}{8}$ in. angles, respectively single, double, single, single, double, double as taken from the centre. The diagonal ties, taken from each end, will be, first, 4 in. by $\frac{3}{8}$ in. flat; second, 4 in. by $\frac{5}{8}$ in. flat. At the centre there will be two angles 3 in. by 3 in. by $\frac{3}{8}$ in. There will be twelve girders about 46 ft. long (fig. 5) forming a continuation of the others, and twelve similar girders fixed centrally between them. Circumferential bracing will be provided, as shown in fig. 6. Between the girders (at each end of the outer series) there will be diagonal bracing of 2 in. by $\frac{3}{8}$ in. flat. Between the stanchions a ring of $2\frac{1}{2}$ in. by $\frac{3}{8}$ in. flat at the centre of their height, and between this ring and the feet diagonal bracing of $2\frac{1}{2}$ in. by $\frac{3}{8}$ in. flat. All the bracing will be attached to the girders and stanchions by $\frac{3}{4}$-in. bolts.

The forty-eight tank girders will each be 10 in. by $3\frac{1}{2}$ in. by $\frac{1}{2}$ in. channel, fixed perfectly plumb at equal distances round the tank. Twenty-four of them will be exactly in line with the channel guides on the face of the standards, and attached to them by $3\frac{1}{2}$ in. by $3\frac{1}{2}$ in. by $\frac{1}{2}$ in. angles not less than 3 ft. long and having eight $\frac{7}{8}$-in. bolts to each angle. The channel guides will be provided with eleven pairs of wing-plates, $3\frac{1}{2}$ in. by $3\frac{1}{2}$ in. by $\frac{1}{2}$ in. by 9 in. long, riveted on by $\frac{3}{4}$-in. rivets countersunk on the inside.



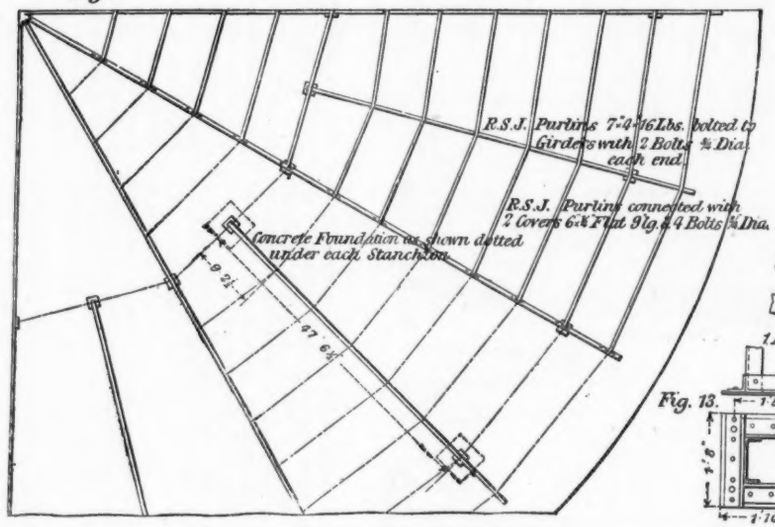
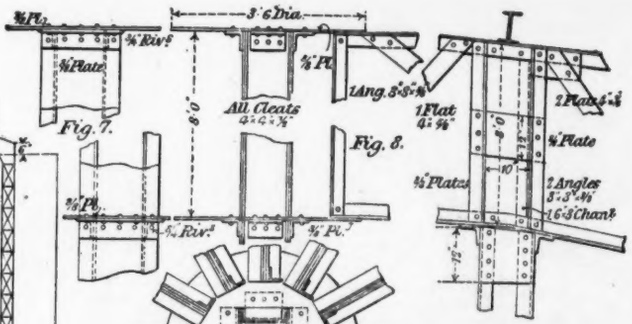
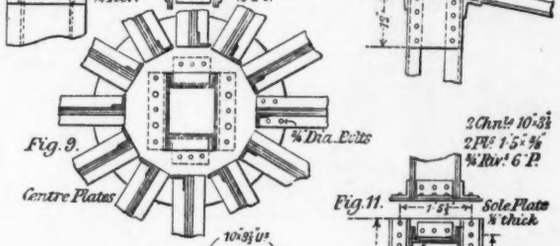
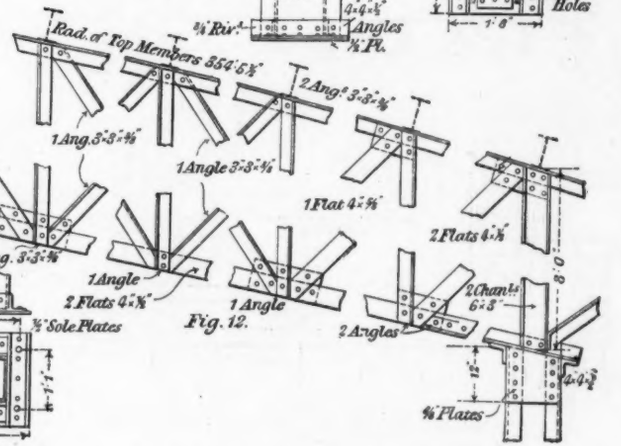
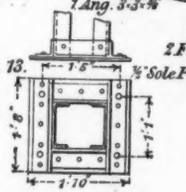


Fig. 6
R.S.J. Purlins 7"×4"×16 Lbs. bolted to girders with 2 Bolts ¾ Dia. each end.
R.S.J. Purlins connected with 2 Covers 6"×¼ Flat 9 lg. & 4 Bolts ¾ Dia.
Concrete Foundation as shown dotted under each Stanchion
9'2½"
97'6½"





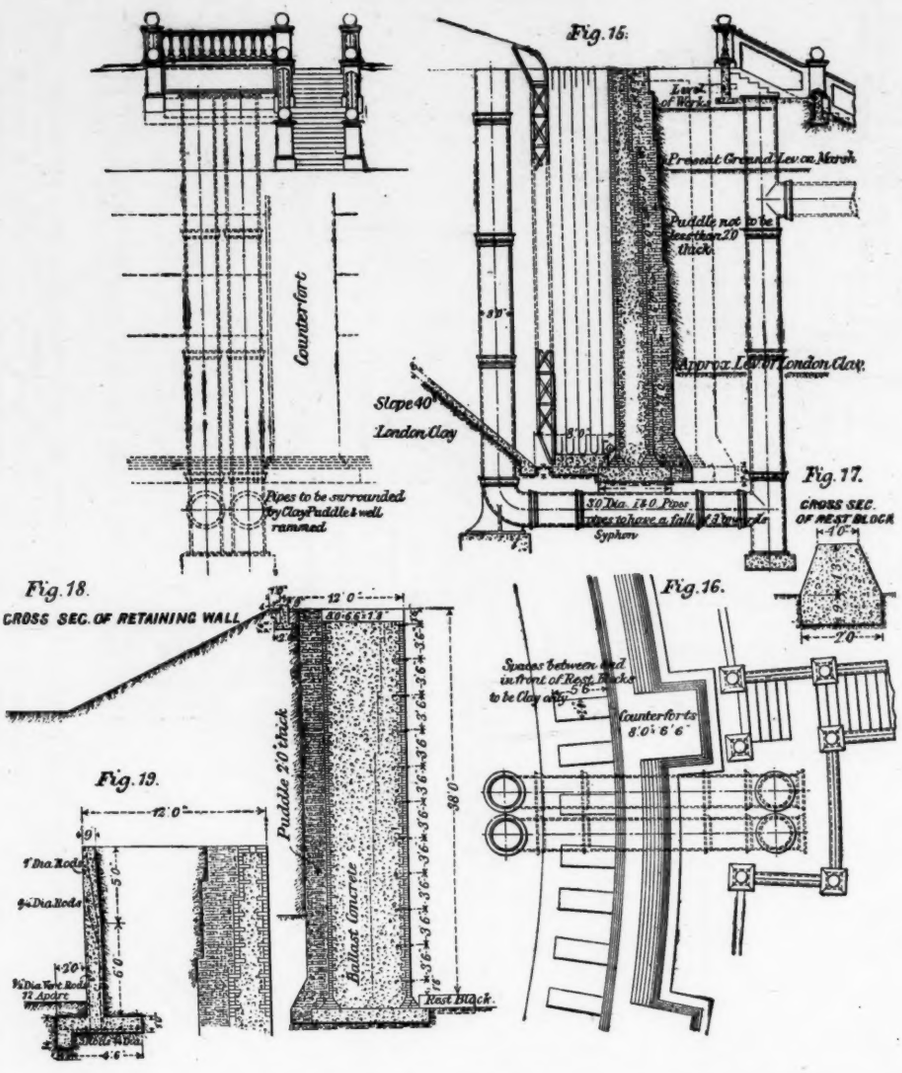




The Gasholder.

In regard to the gasholder itself, the contract for this was let in 1914 to the Berlin Anhaltische Maschinenbau Actien Gesellschaft—known as the "B.A.M.A.G."—but owing to the outbreak of war it, of course, lapsed. The Tottenham Company thereupon made arrangements for executing the construction themselves. But again, in consequence of labour difficulties occasioned by the war, they were unable to proceed with the work. The construction of the holder, therefore, has had to be postponed; but it will be proceeded with as soon as circumstances permit. It is of the greatest importance that it should be available for use at the earliest possible moment, as the output of gas is increasing so rapidly. The new vertical retort section of the works alone is capable of producing 4,750,000 c.ft. per day. The inner lift of the holder will be 212 ft. 4 in. dia.. measured to the face of the vertical stay plates, and 38 ft. $6\frac{5}{8}$ in. deep from the bottom of the cup to the top side of the curb plate. The top curb of the holder is to be formed of ninety-six steel plates, $\frac{3}{8}$ in. thick, cut to the correct shape.

The joints will be planed, so that they accurately butt each other; and they will be joined with an inner and outer butt-strip, 9 in. wide by $\frac{7}{16}$ in. thick, double riveted with $\frac{3}{4}$-in. rivets at 4 in. pitch. The outer edge of each plate will be stiffened with two 3-in. by 3-in. by $\frac{1}{2}$-in. angles with $\frac{3}{4}$-in. rivets. The inner corners of the web plates will be connected by one 3-in. by 3-in. by $\frac{1}{2}$-in. steel angle, bent to the correct radius. This angle will be connected horizontally to the bottom curb and vertically to the top curb by 3-in. by $\frac{1}{2}$-in. struts and 3-in. by $\frac{1}{2}$-in. lattice bars, as shown. There will be forty-eight vertical stays inside the holder, one



opposite each standard and intermediate guide. Each of these stays will consist of double steel angles, 3 in. by 3 in. by $\frac{3}{8}$ in., with 2½-in. by $\frac{3}{8}$-in. lattice bars, and will be 1 ft. 9 in. in depth. At the top each stay is to be connected to the crab-plate angles by ¾-in. rivets. The feet of the stays will project 12 in. below the cup, in order to receive the bottom guide carriages.

The bottom cup, fig. 20, will be formed of 10-in. by 3½-in. channels bent to the proper sweep, and will be jointed with pressed-steel joint-plates on the inside of the cover plates, and riveted with $\frac{5}{8}$-in. rivets at 3-in. pitch. The inside of the cup is to be 2 ft. 4 in. deep. The outer edges will be strengthened by a steel flat, 3 in. by ½ in., riveted on with $\frac{5}{8}$-in. countersunk rivets at 4-in. pitch. Wrought-iron bearing pieces, 8 in. by 2 in. by 1 in. thick, will be secured to each cup channel by two $\frac{5}{8}$-in. countersunk rivets, so as give a level bearing to the grip.

In regard to the side sheets, the vertical stays will be riveted to a vertical plate, ½ in. thick by 1 ft. 1 in. wide by 37 ft. 6 in. long, in one piece, with $\frac{5}{8}$-in. rivets at 8-in. pitch. This vertical plate will be riveted to the main curb plate and to the cup-plates. The row of plates next the curb-plates will be ½ in. thick by 3 ft. 2½ in. deep, and the row above the cup ½ in. thick by 3 ft. 2 in. deep. The top row will be riveted to the $\frac{5}{8}$-in. plates by ¾-in. rivets, 2$\frac{5}{8}$-in. pitch, and the bottom row will be riveted to the cup plate by $\frac{3}{8}$-in. rivets at 2-in. pitch. The remainder of the sheeting will be of No. 10 S.W.G. by 3 ft. 2$\frac{5}{8}$ in. deep or 3 ft. 1½ in. centres.

The crown sheets of the holder, next to the $\frac{5}{8}$-in. plates will be $\frac{5}{16}$ in. thick and forty-eight in number, 3 ft. wide and about 13 ft. 8 in. long. The plates will be lap-jointed, thinned-out, and tucked under the butt-strips of the $\frac{3}{8}$ in. plates where these occur. The remainder of the crown sheeting will be either radial or herring-bone; but in either case the plates next the $\frac{5}{16}$-in. plates will be No. 7 S.W.G., and the remainder No. 10 S.W.G.

The riveting will be as follows:

Sheets of No. 10 S.W.G.—1$\frac{1}{8}$-in. lap, $\frac{5}{16}$-in. diameter, 1$\frac{1}{4}$-in. pitch.
Sheets of No. 7 S.W.G.—1$\frac{1}{4}$-in. lap, $\frac{3}{8}$-in diameter, 1$\frac{1}{2}$-in. pitch.
Sheets of ½ in. thickness—1$\frac{1}{4}$-in. lap, $\frac{3}{8}$-in. diameter, 1$\frac{1}{2}$-in. pitch.
Sheets of $\frac{5}{16}$ in. (cups and grips)—2$\frac{1}{2}$-in. lap, $\frac{5}{8}$-in. diameter, 2-in. pitch.
Sheets of $\frac{3}{8}$ in. (cups and grips)—2$\frac{1}{2}$-in. lap, $\frac{5}{8}$-in. diameter, 2$\frac{1}{2}$-in. pitch.

A seal plate to surround the inlet and outlet pipes is to be attached to the crown sheeting. The upper portion of this plate is to be $\frac{3}{8}$-in. thick, the lower part $\frac{1}{16}$-in. thick, and is to extend 15 in. below the coping level of the tank. It is to be attached to the crown sheeting by 3-in. by 3-in. by $\frac{3}{8}$-in. angle ring with moulded joint. In the centre of one side an 8-in. diameter hole will be cut, and an 8-in. rack-and-pinion valve bolted to it.

Counterbalance weights, to compensate for the weight of the sealing arrangement, are to be attached to the underside of the roof sheets in two places; so that the three weighted points will form an equilateral triangle. There will be manholes, 3 ft. 6 in. diameter, over the inlet pipe and outlet pipes. The opening of each will be stiffened by a welded ring, 3 in. by ½ in. in section, riveted on by $\frac{5}{8}$-in. rivets of 4-in. pitch.

The dimensions of the other four lifts of the holder will be as follows [see fig. 20]:

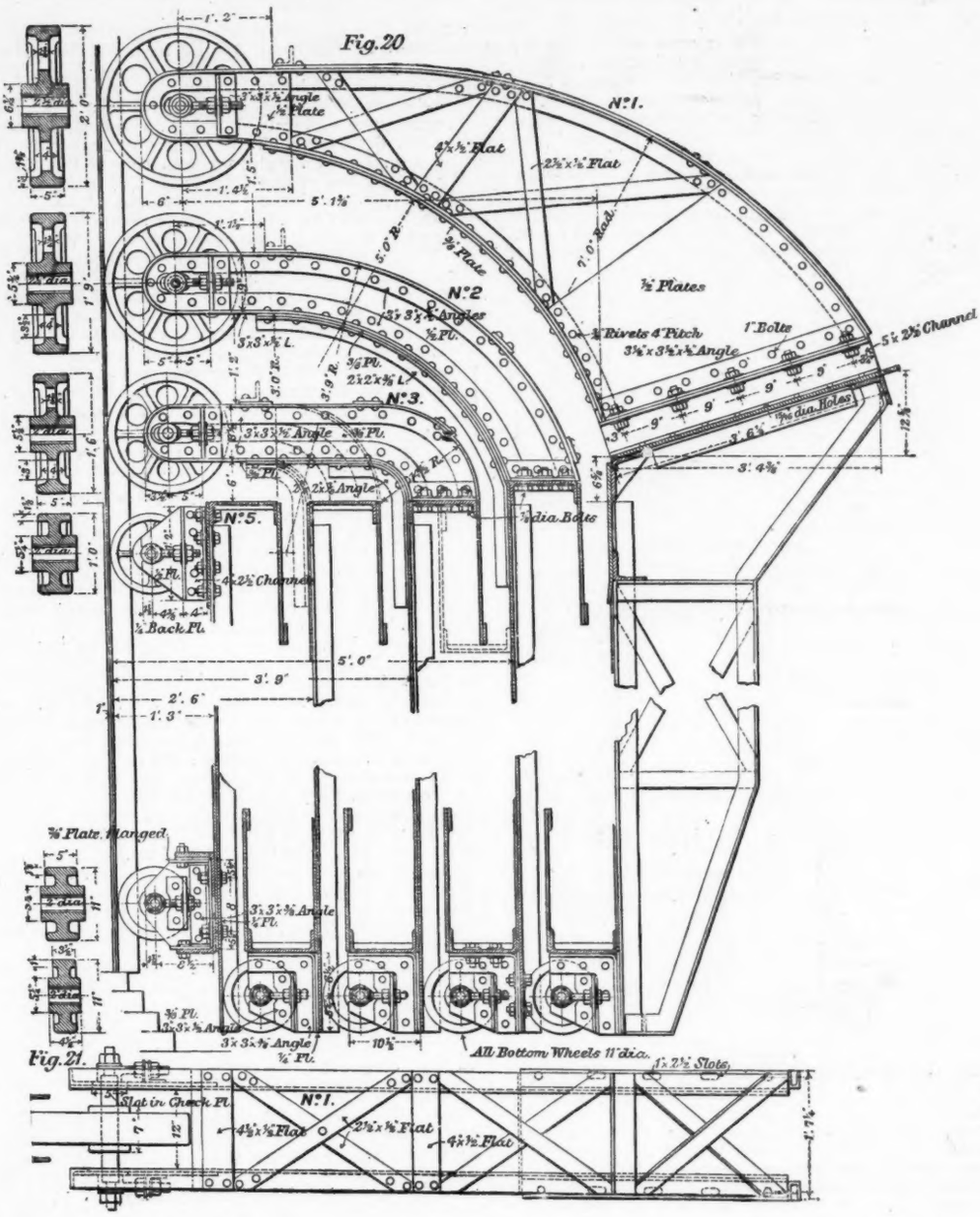
Second lift, 214 ft. 10 in. diameter from faces of the vertical stay plates.
Thir1 lift, 217 ft. 4 in. diameter from faces of the vertical stay plates.
Fourth lift, 219 ft. 10 in. diameter from faces of the vertical stay plates.

Each lift will be 38 ft. deep, measured from the bottom of the cup to the top of the grip outside plates. All the cups of the second, third, and fourth lifts will be the same as those described for the first or inner lift.

There will be forty-eight vertical stays to each lift, constructed of 7$\frac{3}{4}$-in. by 2$\frac{7}{8}$-in. by 18·21-lb. steel channel (in one piece) riveted to a steel angle, 3 in. by 3 in. by ½ in., on each side, with $\frac{5}{8}$-in. rivets countersunk in the channel, 8-in. pitch. The angle will be riveted to a vertical plate, ½ in. thick by 13 in. wide and 38 ft. 6 in. long, in one piece; and $\frac{5}{8}$-in. diameter rivets will be used, pitched at 8 in. Any joints in these angles will be fitted with $\frac{3}{16}$-in. angle cover plates, 18 in. long, and countersunk rivets of $\frac{5}{8}$-in. diameter. The row of plates next the cup and grip will each be ½ in. thick by 2 ft. 11$\frac{5}{8}$ in. deep; the rivet centres being 2 ft. 8¾ in. They will be riveted to the $\frac{7}{16}$-in. cup and grip plates by $\frac{5}{8}$-in. rivets placed at 2-in. pitch. The rest of the side sheeting will be of No. 10 S.W.G., 3 ft. 2$\frac{5}{8}$ in. deep, riveted at 3 ft. 1½ in. centres.

The outer (fifth) lift, of 222 ft. 4 in. diameter to the face of the vertical stay plates, will be 38 ft. deep measured from the bottom of the curb to the top of the grip plate. The grip of this lift will be the same as for lifts 2, 3, and 4 [fig. 20].

The bottom curb will be 15 in. deep, and will consist of two



steel angles, 6 ft. 6 in. by $\frac{5}{8}$ in., riveted to the $\frac{1}{4}$-in. plates forming the bottom row of the side sheeting with $\frac{3}{4}$-in. rivets, 6-in. pitch, zig-zag. The angles will be in long lengths joined with carefully fitted angle covers, $\frac{1}{2}$ in. thick, not less than 3 ft. long, riveted with $\frac{3}{4}$-in. rivets.

The row of plates next the grip will be $\frac{1}{4}$ in. thick, 2 ft. $11\frac{3}{8}$ in. deep; the centre lines of rivets being 2 ft. $8\frac{3}{8}$ in. apart. The bottom row will consist of $\frac{1}{4}$-in. plate, 3 ft. in depth. The row next above will be of No. 7 S.W.G., 2 ft. 3 in. deep; and the remainder will be No. 10 S.W.G., 3 ft. $2\frac{3}{8}$ in. deep, with riveting spaced at 3 ft. $1\frac{1}{2}$ in. centres. The vertical stays of this outer lift will correspond with those of lifts 2, 3, and 4.

There will be twenty-four top carriages to the inner lift, formed of 3-in. by 3-in. by $\frac{1}{2}$-in. angles, $\frac{1}{2}$-in. web plates with $\frac{3}{8}$-in. cover plate at the top and underside of each, as shown in figs. 20 and 21. All the riveting will be $\frac{3}{4}$ in. Each of the carriages will be secured to bases of Z-iron by means of eight bolts, $\frac{7}{8}$ in. diameter. The channel bases will be 5 in. by 3 in. by $2\frac{1}{2}$ in., riveted to the curb plates by seven rivets, each of $\frac{7}{8}$ in. diameter, and made perfectly gastight.

On the second lift there will be twenty-four carriages formed of 3-in. by 3-in. by $\frac{1}{2}$-in. angles with $\frac{1}{2}$-in. web plates, with $\frac{3}{8}$-in. cover plates at the top and underside. The carriages will be riveted to the grip channels and side sheeting; the carriage angles being extended to enable this to be done [see fig. 20].

The third lift will have twelve carriages, similar (except in length) to those for the second lift; but the web plate will be $\frac{3}{8}$ in. thick. There will be twelve carriages on the fourth lift, similar (except as to length) to those on the second and third lifts, but arranged alternately with those on the third lift. The fifth lift will be provided with twenty-four carriages, formed of two channels, 4 in. by 3 in., riveted to a back plate, $\frac{1}{4}$ in. thick, and and having web plates $\frac{1}{4}$ in. thick. The carriages will be bolted to the grip by eight $\frac{3}{4}$-in. bolts each.

Cast-iron rollers will be fitted to the carriages as follows [see figs. 20 to 27]:

Inner lift: Rollers 24 in. diameter, 5-in. face.
Second lift: Rollers 21 in. diameter, 5-in. face.
Third lift: Rollers 18 in. diameter, 5-in. face.
Fourth lift: Rollers 18 in. diameter, 5-in. face.
Fifth lift: Rollers 12 in. diameter, 5-in. face.

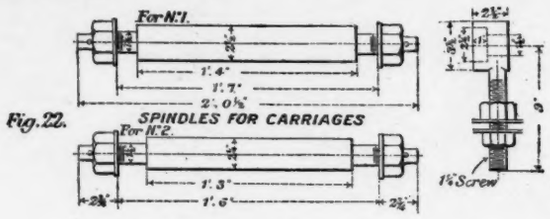
The rollers will turn on gun-metal bushes, $2\frac{1}{2}$-in. outside diameter, fitting between the cheek-plates of the carriages, with a mild-steel $1\frac{1}{2}$-in. pin passing through them. The pins will have a nut and pin at each end; and wrought-iron washers will be fitted between the rollers and the cheek-plates as required. The mild-steel pins will pass through 1-in. eyebolts for adjustment purposes—these eyebolts being secured to angle-iron pieces on the brackets, with a nut on each side. The bottom carriages of all, except the outer lift, will be formed of 3-in. by 3-in. by $\frac{3}{8}$-in. angles with $\frac{3}{8}$-in. web-plates. The angles will be riveted to a back plate $\frac{1}{4}$-in. thick; and the carriage will be secured to the continuation of the vertical stay by four $\frac{3}{4}$-in. bolts.

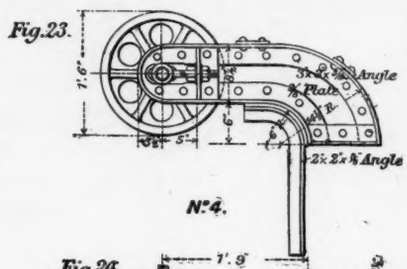
There will be forty-eight carriages to each lift. The bottom curb of the outer lift will be fitted with forty-eight carriages between the angles forming the curb. They will be formed of two 3-in. by 3-in. by $\frac{3}{8}$-in. angles, $\frac{3}{8}$-in. web-plates, and $\frac{1}{4}$-in. back plate. They will be bolted to the curb angles by four bolts each side.

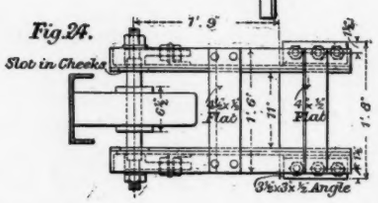
The forty-eight rollers for the bottom of the outer lift will be 11-in. diameter and 5-in. face. All the others will be of the same diameter, but $3\frac{1}{2}$-in. face. All the rollers will be of cast iron and will turn on steel bushes, $2\frac{1}{4}$-in. in diameter, secured between the

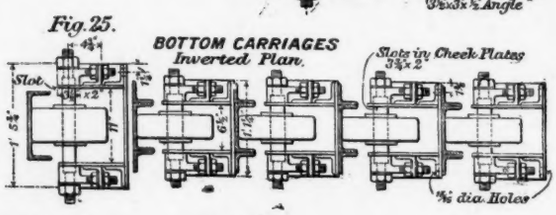
cheek-plates of the carriages by 1¼-in. mild steel pins. These pins will have a nut and split-pin at each end, and will pass through 1-in. eyebolts for the purpose of adjustment. The eyebolts will pass through angle-iron brackets riveted to the carriages, with a nut at each side.

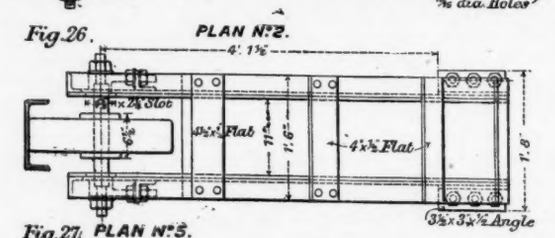
The carriages of the first, second, and third lifts will be stiffened by angle-raking stays. Those to the first lift will be of 3-in. by 3-in. by ⅝-in. angle secured to the carriage by two ¾-in. rivets, and to the curb plate by two ¾-in. rivets at each end. Those of the second lift will be of 3-in. by 3-in. by ½-in. angle secured to the carriage by two ¾-in. rivets, and to the grip-plates by two ¾-in. rivets at each end. Those to the third lift will be of 3-in. by 3-in. by ⅜-in. angles, secured to the carriage and grip-plates as in the second lift.

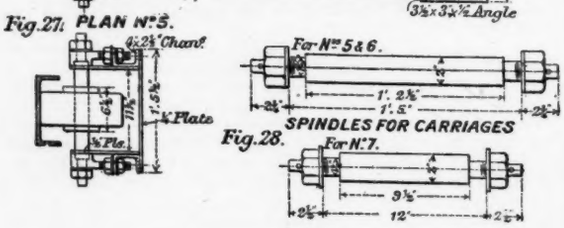












THE GUIDE FRAMING.

Turning to the guide-framing, there will be twenty-four cast-iron base plates for the standards. These base plates will each be 7 ft. 10 in. long by 9 in. deep, ribbed externally and internally. The thickness of the metal in all parts will be 1¼ in. Each base will have seven holes, 1¾ in. diameter, cast in for the holding-down bolts, and seven holes, 1 in. diameter, for bolting to the standards.

There will be twenty-four standards, each being built-up in five lengths, as shown in figs. 29 to 33—the top piece being 37 ft. 9 in. long, and each of the others 37 ft. 4 in. long. They will be tapered, so as to give a uniform batter to the outside when the five pieces are bolted together. The first or bottom piece will be 7 ft. 6½ in. wide at the bottom and 6 ft. wide at the top at the centre of the gusset plates, and will consist of two steel channels, 10 ft. by 3½ in. by ½ in., at the tank face, riveted together by a 10 in. by ½-in. steel plate between them. The rivets, of 1 in. diameter, countersunk on the face, will be pitched at 12 in., zig-zag.

The back member will be two steel angles, 8 in. by 8 in. by ¾ in. The channels and angles will be riveted at the base to a welded angle frame, 6 in. by 6 in. by ¾ in., with holes drilled in it for the holding-down bolts. To the centre of the bottom frame of 6 in. by 6 in. by ¾ in. angles on each side of the standard, will be riveted a piece of steel plate, 6 in. by ¾ in. by 21 ft. long, with a hole 1 1/16 in. in diameter drilled through it and the gusset plate and the angle frame, for the pin to secure the bottom end of the diagonal ties.

The bracing of the guide-framing will consist of two struts on each side and back, of 4-in. by 4-in. by ½-in T-iron, to which will be riveted stiffening plates, ¼ in. thick; three struts of 4½-in. by ¾-in. flat; and six pairs of lattice bracings of 4½ in. by ¾ in. on each side and back of the standard. At the top and bottom there will be shaped gusset plates, ⅜ in. thick, six in all; and to each of the top gussets will be riveted two steel angles, 4½ in. by 4½ in. by ½ in., with a stiffening plate ⅜ in. thick between them.

The riveting of the guide-framing will be as follows:

Bottom, 6-in. by 6-in. angle to gussets: ⅞-in. rivet, two rows, 6-in. pitch.
Channels and angles to gussets: 1-in. rivets, two rows, 6-in. pitch.
Tee struts and lattice bars: two rivets, 1 in. dia. at each end of each member.
Stiffening plate to tees: ⅝-in. rivets at 6-in. pitch.
Angles to top gusset plates: 1 in. diameter, 6-in. pitch, countersunk; also 1-in. bolts between for bolting to the girders. The same angles to the ⅜-in. top stiffening plates, ⅞-in. rivets, 6-in. pitch.

The second length of each standard will be constructed like the first length, but no bottom angle frame will be required. It will be 6 ft. wide at the bottom and 5 ft. wide at the centre of the top gussets. At the tank face there will be two steel channels, 10 in. by 3½ in. by ½ in., with 10-in. by ⅜-in. plate between. At the back there will be two steel angles, 7 in. by 7 in. by ¾ in., and 4-in. by 4-in. by ½-in. tee struts. There will be stiffening plates, ¼ in. thick, and lattice struts and bars 4 in. by ¾ in. flat. The top angles to the gusset plates will be secured by material 4 in. by 4 in. by ½ in.; and the stiffening plates will be ⅜ in. thick and the gussets ⅜ in. thick. The riveting will be as for the first length.

The third length of the standard will be of similar construction to the second, but 5 ft. wide at the bottom and 4 ft. wide at the top of the gusset centres. At the tank face the two steel channels will be 10 in. by 3½ in. by ½ in. At the back the angles will be 6 in. by 6 in. by ¾ in. The tee struts will be 4 in. by 4 in. by ½ in.; the lattice struts and bars, 4 in. long, ⅜ in. flat; and the top gusset plates ½ in. thick. The rivets will be as before, except that ⅞-in. rivets will be used on the connections to the main channels and angles, instead of 1-in. and ⅞-in. bolts and rivets to the angles at the top gussets.

The fourth length of the guide-framing will follow the design of the second and third, but will be 4 ft. wide at the bottom and 3 ft. wide at the top at the gusset centre. The size of members will be: At the tank face, two steel channels, 10 in. by 3½ in. by ½ in.; at the back, two angles, 5 in. by 5 in. by ¾ in., tee struts, 3½ in. by 3½ in. by ½ in.; stiffening plate, ¼ in. thick; lattice bars and struts, 3½ in. by ⅜ in. flat; riveting, the same as for the third length.

The fifth length of the guide-framing will be the same as the fourth, but 3 ft. wide at the bottom and 2 ft. wide at the top. The sections of the members will be: At the tank face two steel channels, 10 in. by 3½ in. by ½ in.; at the back, two steel angles, 4 in. by 4 in. by ¾ in.; tee struts, 3 in. by 3 in. by ½ in.; ¼-in. stiffening plates; lattice bars and struts, 3 in. by ⅜ in. flat. The riveting will follow that for the third and fourth lengths.

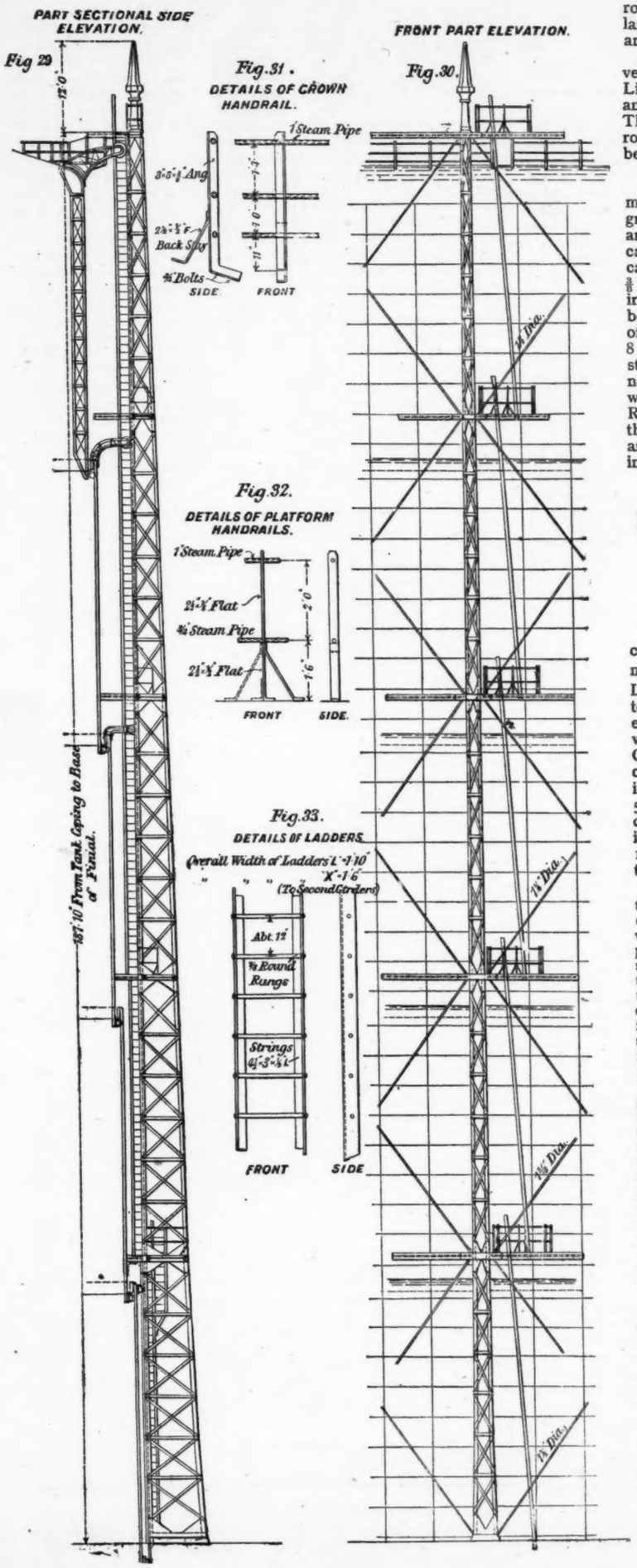
There will be twenty-four cast-iron finials, 12 ft. high, as shown in fig. 29. The metal will be ⅝ in. thick throughout. A foot will be cast on, so that the finial can be bolted to the centre plate at the top of the standards by four 1-in. bolts.

There will be five tiers of girders. Each girder will be about 28 ft. 6 in. long. The first tier will be 6 ft. wide, the second 5 ft., the third 4 ft., the fourth 3 ft., and the fifth 2 ft. One girder will have a steel chequered plate, ⅜ in. thick, at the end, in place of one pair of lattice bars; the 4½-in. and 4½-in. angle struts being riveted to it. A manway will be cut in this plate, for a ladder to pass through.

Diagonal ties will be provided between each pair of girders, and between the bottom girders and the base of the standards [fig. 30]. Each tie will be made in two parts, having an eye forged at one end and a screw at the other end for tightening-up. Each pair of ties will be attached to an octagonal forging, 4½ in. by 1½ in. section, 8 in. across, through which the screwed ends will pass with a nut on each side. The inner face of the four sides where the rods are screwed will be accurately machined. Cast-iron "stars" will be bolted to each side of the octagonal forging by four ⅞-in. bolts to each pair. The sizes of the diagonal ties and pins will be as follows:

Standards to first tier, 1⅛ in. diameter, 1⅜ in. diameter pin, end 1⅛ in. thick.
First to second tier, 1⅛ in. diameter, 1⅛ in. diameter pin, end 1⅛ in. thick.
Second to third tier, 1¼ in. diameter, 1¼ in. diameter pin, end 1¼ in. thick.
Third to fourth tier, 1⅛ in. diameter, 1⅛ in. diameter pin, end 1⅛ in. thick.
Fourth to fifth tier, 1⅛ in. diameter, 1⅛ in. diameter pin, end 1⅛ in. thick.

The pins will be of mild steel, and will pass through the tie-



rods above and below the girders. Ladders and landings will be provided as indicated in figs. 29 and 30.

Anti-freezing apparatus will be installed, to prevent freezing of the water in the cups and tank. Live steam will be provided for this purpose; and two steam services to each cup will be fitted. The pipes will be laid in a covered wooden trough round half the circumference of the tank, and will be packed in with fossil meal.

Mr. Broadberry has specified with reference to material that the cast iron is to be of the best grey metal. Test bars, 1 in. wide, and 2 in. deep, are to be cast with each running, and must be capable, when placed on supports 3 ft. apart, of carrying in the middle a weight of 28 cwt., with ⅜ in. deflection, without breaking. The wrought iron for the plates, rods, &c., must be capable of bearing a tensile strain of 23 tons per square inch of section, with 15 p.ct. extension in a length of 8 in. The rolled steel must possess a tensile strength of not less than 26 tons per square inch nor more than 30 tons per square inch of section, with an elongation of 20 p.ct. on a length of 8 in. Rivets and bolts to be made of Yorkshire iron of the toughest quality; the rods of which the rivets are made to bear a load of 25 tons per square inch before fracturing.

FOUNDATIONS OF A FIVE-MILLION CUBIC FEET HOLDER AT BALTIMORE.

A communication to the American "Gas Record," from Mr. G. Beadenkopf, the Chief Engineer of the Baltimore Consolidated Gas, Electric Light, and Power Company, comprises some interesting details of the foundations for a gasholder erected at Baltimore about five years ago, which were constructed under the supervision of the Company's engineering department. The holder consists of five lifts, rises 222 ft. 6 in. when fully inflated, and including the tank contains about 5,500,000 lbs. of steel. The outer lift is 216 ft. diameter, and the inner lift 204 ft. 3 in. The tank is 219 ft. diameter and 37 ft. 6 in. deep, of which 10 ft. are below ground; and it is capable of containing 10½ million (short) gallons of water.

The preliminary testing of the site comprised sixteen 4-in. borings, of which fifteen were carried to a depth of 25 ft., and one to 32 ft. The soil as drawn was stored in tall glass jars 1½ in. diameter, and preserved for future reference. Stability tests of the soil were taken by a load of 6000 lbs. supported on a timber base 12 in. square, applied at various parts of the site; the settlement being carefully recorded in each case. Special attention was given to the circumference, which would have to take the weight of the sides and standards. A simpler test that gave satisfactory results, was a 1 in. round bar of iron cut off square at the lower end. If a man, by placing all his weight on the bar, could force it easily into the ground, the soil was considered too soft, and was removed until the man could only sink the bar with difficulty. A 10-in. drain was carried half-way round the circumference, to drain the work during erection, and was permanently adopted to take the overflow from the tank and the surface water. By these means, it was ascertained that the ground support was sufficiently firm to warrant dispensing with reinforced concrete or piling. The subsoil was found to consist of several feet thickness of firm clay, with an underlying layer of sandy gravel, and was about 850 ft. distant from a river. In some instantces, soft soil was removed to a depth of 10 ft. below the original surface of the ground.

A rim of concrete 12 ft. wide was laid over the outer portion, in two 12-in. layers; and the remainder was filled in 18 in. thick—one 12-in. and one 6-in. layer. The concrete was laid in one block with the usual precautions in joining-up each day. The work occupied 28 days. The completed slab was 242 ft. diameter, and contained 3340 c.yds. The load on the bottom of the concrete formation ranged from 2530 lbs. per sq. ft. over the interior to 4600 lbs. under the standards. Careful tests after the tank had been filled for four weeks indicated an average settlement of ½ in., and a difference between maximum and minimum levels round the circumference of ⅜ in. After a lapse of five years, the additional settlement was found to be only ⅛ in.

ILLUMINATING ENGINEERING SOCIETY.

THE PRESIDENT'S ADDRESS.

Last Tuesday week, Mr. A. P. Trotter delivered his Presidential Address to the Illuminating Engineering Society. In the first place, he referred to the term "illuminating engineer," expressing a doubt that, when the Society was founded seven years ago, anybody was entitled to call himself an illuminating engineer. Therefore the Society wisely chose its title. To-day, an astonishing number of considerations must be studied by one who undertakes to give competent and impartial advice on the most appropriate and economical type of lighting for any given case—on the selection between electric light, gas, oil, or candles; whether the supply should be taken from the public mains or generated by a private plant; whether the gas to be used should be coal gas, petrol-air gas, or acetylene. And a yet more experienced man must be found who would claim to be able to carry out in detail the lighting of a palace, a railway terminus, a clothing factory, and a coal mine, in the best possible manner. Of these, the palace would perhaps be the most easy. The President is proud to have such men among the members of the Society. He alluded to the progress of scientific work, and to the object of most scientific societies. The multiplication of scientific societies is sometimes regretted, more especially by older men. There were some 120 scientific and technical bodies before the war connected with engineering and various branches of physical science.

SCOPE OF THE SOCIETY.

Discussing the extent of the scope of the Society, he said that while it is true that advance can only be made by specialization, and that the leading engineers of the day are specialists, the peculiar value of a Society such as theirs is that the membership, and therefore the audiences, and hence the discussions, are representative of interests which not only widely differ, but are in some cases in spirited competition. It was predicted when the Society was founded that it contained elements so antagonistic that it could not hold together. This prediction had proved wrong. The Society has been held together by the bond of science; and the fact that it has been so held proves, if proof were needed, that it is essentially a scientific society. The members are ready to hear what an engineer has to say about the distribution of gas or electric light to thousands of consumers, and are equally prepared to listen to the criticism of a needlewoman on the lighting of her worktable. And since the members are anxious to help architects, borough engineers, factory owners and inspectors, railway managers, searchlight operators, directors of museums and picture galleries, dyers, drapers and market salesmen, and five hundred other users of light, to use light economically, conveniently, usefully, and efficiently, they seek their co-operation.

"The Eye alone is the Judge." When members are called upon to advise on the lighting of some place or building, or to carry it out, they examine the conditions and consider the requirements. They recommend the most advantageous method, and calculate the appropriate arrangement of lamps. If the job is one of some importance, a specification is drawn by a consulting engineer, tenders are invited, the best one is selected, a contract is made, and the work is carried out by a contractor. The results are checked by a photometer, and the client is told that the job is finished. Then he comes and judges as to whether the lighting is "good or bad" merely by using his eyes! This is one of the difficulties of this branch of engineering; and it warns members not to rely too much on rules and formulæ, and to interpret the readings of photometers with discretion. For this reason the Society seeks the assistance of that branch of the medical profession which cares for our eyes—that branch to which the distinguished retiring President, Sir William Bennett, belongs. The members also look to physical science in connection with new sources of light, and to applied mathematics for methods of exact or of ready measurement. They are also dependent on that difficult branch of chemistry, the art of glass-making; and they must be able clearly to explain to manufacturers what is wanted, and to see that it is obtained. Few, if any, scientific societies spread their activities over so wide a range, and are in touch with so many different arts and industries. When a subject is considered in a truly scientific spirit, trade interests disappear, and professional competition is forgotten.

Solus oculus est judex, wrote Lambert: The eye only is the judge. Even if an instrument should one day be invented, as Lambert hoped, which would indicate a quantity of light on a scale like a thermometer, the client's opinion of the lighting will not be materially influenced. Illuminating engineers must therefore give some attention to the subjective and to physiological interpretations of sense impressions. These are generally of a complex character; and one of the first steps is to disentangle the factors, so that they may be dealt with one by one. The Society has studied the question of glare. Glare is the effect of a dazzling light. But this does not define glare; it only evades the definition by shifting it. It is much more easy to suggest means for avoiding glare than to define clearly what is meant by it. This is because it is a complex phenomenon arising from the relation of multiple sensations, while dazzle generally means too much light, which is a comparatively simple affair.

A LEGAL STANDARD OF LIGHT.

The President proceeded to discuss the psychological side, nomenclature, and controversies. He sketched the work of the National Illumination Committee of Great Britain, of the Engineering Standards Committee, and of the Department of Scientific and Industrial Research. He spoke about a legal standard of light—remarking in this connection that the unit of luminous intensity has been agreed upon by France, Great Britain, and the United States, and will probably be adopted by all civilized nations. It is called the International Standard Candle. This is a rather unfortunate expression, for it makes a confusion between a unit and a standard. The unit may be embodied in a lamp burning pentane, amyl-acetate, or some other substance, or in an electric lamp, or as the average of a group of lamps, and may be one-tenth, or any other accurately known fraction of the light emitted by the lamp. The unit was at one time embodied in a certain kind of candle, subject to certain corrections. It was natural to call this the standard candle; and it seemed to be redundant to state that it emitted the unit of luminous intensity. Great confusion was made at one time in electrical science between units and standards; and we should be on our guard. All are agreed upon the unit, which is derived from the old parliamentary candle, and which still bears the name. But the desideratum now is some actual apparatus which can be constructed to a definite specification, and, subject to working corrections, can be relied upon to emit unit luminous intensity. A calorific test having been substituted for a luminous test of the quality of gas, it seems likely that the ten-candle pentane standard which has been for some years a standard of a very limited nature, will be dispossessed of the small legal dignity with which it was invested. Administrative changes will be made before a legal unit or standard of light is constituted; and perhaps we shall follow the action of other countries where science is not so despised by officialdom.

STREET DARKENING—A SURVEY FROM ABOVE AT NIGHT.

Turning to the subject of street darkening, the President was extremely interesting. In the course of this he said it was not possible at the present time to discuss freely the desirability of darkening the streets of towns during war time as a protection against air raids, or the degree or mode of darkening if this is considered advisable. While a frank discussion on the subject would probably remove many misunderstandings, it must remain for the present one of those in which we should submit to authority in the disciplined way to which the war has accustomed us. One of the difficulties has been the overlapping of the functions of different authorities, and the adjustment of their opinions. The subject of street darkening for war purposes was, of course, new to everybody; and it is not surprising mistakes were made at first.

In November, 1916, the President was sent for, and was asked to consider how much light could be allowed without revealing the topography of the district. In order to study this question more carefully, he was invited to make an aerial reconnaisance from a balloon at night. He proceeded: A stiff east wind was blowing, and threatened to carry to the west the two balloons which ascended. They were therefore so ballasted that we shot up at once to 8500 ft., where we found ourselves in the calm which sometimes lies between an east wind and a higher reverse current. There was plenty of time to study the lighting over a district of some five or six miles in diameter. The night was clear, cloudless, and moonless. The most striking feature was the unmistakable contrast between the black river and parks and the dim shimmer of the gloomy houses. Innumerable windows with drawn blinds gave the appearance of a granular film of brightness nearly equal to that which would have been produced by an illumination of 0·1 foot-candle. At that date, the streets were easily traceable by the patches of light below the screened lamps. The sight was very beautiful; and it is sufficient to say that the authorities are of opinion that it is impossible to hide such a city as London by reducing the street lighting. On the other hand, this does not apply to small towns; for, during a run of forty miles into the country, after the waning moon had risen, at the trailing height of 350 ft., it was impossible to distinguish between houses and haystacks. A small town and several villages were crossed without being seen. I can confidently assert that it is possible to obliterate a small town by extinguishing all the street lamps and by a careful shuttering and screening of the windows. But this screening must be intelligently carried out.

In the warfare of the future, it will be necessary for engineers, to consider the best means for the control of street lighting, and indeed, of all outdoor lighting, from the source, and provision for immediate extinction, when called upon by the military authorities to take this step. An independent street lighting system affords an excellent method of giving warning of an air-raid at night. It must be remembered that our coast towns, and indeed those near the coast, are visible from a considerable distance at night in peace time. Enemy aircraft, deprived of the guiding lights of towns, have often hopelessly lost their way. Complete darkening of the whole country is undesirable for many reasons, even if it were possible; but a carefully considered reduction of lighting is in many cases well worth much inconvenience and some risk of accidents.

Many other subjects were dealt with, but space forbids further reference to the address.

One of four papers to be read at a meeting of the London Section of the Society of Chemical Industry next Monday is by Messrs. T. F. Harvey, F.I.C., and C. F. Sparks, on the "Rapid Estimation of Pyridine in Ammonia."

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

FLUELESS RADIATORS AND ELECTRIC STOVES.

The Heating of Coroners' Courts.

Comment was made in the "Electric Supply Memoranda" last week [p. 604] upon a paragraph which had appeared in the Press, dealing with the use of flueless gas-radiators in the Southwark Coroner's Court. We have now been favoured by Dr. F. J. Waldo (the Coroner) with the following letter:

SIR,—My annual returns are not being published in print by the Corporation of the City of London—at least, during the war. I therefore have pleasure in enclosing you a copy, in writing, of Part III. of my return for 1916—just made public—for notice by you in the "JOURNAL." I think the matter ought to be of interest to your readers, and I am sure you will agree with me that a stop should be put to the continued use of flueless gas-radiators, which I am told, at the Home Office, are not allowed in factories and workshops under the regulations of the Factory and Workshop Act.

The late Professor Lewes has often agreed with me as to the vital importance of flues, in the proper use of gas, to take the products of combustion safely away, in order to give a safe and, at the same time, cheap and convenient means of heating buildings.

I enclose a cutting from the "City Press" giving two unanimous recent riders of City juries complaining of the inadequate warming of the City Coroner's Court. At the last sitting in my Southwark Court—a long one—the jury passed a unanimous rider complaining of the inadequacy of the heating arrangements by three small electric radiators; the maximum temperature after several hours being 55° Fahr. only.

F. J. WALDO, M.A., M.D., Camb., D.P.H.,
H.M. City Coroner.

The portion of his report for 1916 to the Lord Mayor and Corporation of London to which he refers is given below:

REPORT ON THE HEATING OF THE CORONER'S COURT AT SOUTHWARK.

The ventilation of Courts of Justice is notoriously bad, owing partly, no doubt, to the inherent difficulties of the case. The Court as a rule contains a large amount of cubic space, in which the inmates have to sit for many hours at a stretch; and it is necessary to provide for a renewal of air without draught, and to maintain a temperature of about 60° to 63° Fahr. The new Coroner's Court, Southwark, has failed in each of these particulars; for not only has the system of warming proved ineffectual in keeping the temperature at a comfortable level, but it has proved disastrous by loading the air with poisonous products. The system adopted was that of flueless gas-radiators, which proved so deleterious that I was laid up on two occasions from lung troubles directly attributable to the fumes of carbon monoxide, and chill from inadequate heating. In consequence of my complaints, an analysis was made of the air of the Court by the London County Council. The Chief Officer of the Public Control Department of that body wrote me on the 22nd of January, 1917, saying that "The Officer of the Council who made the analysis of the atmosphere of the Southwark Coroner's Court was the Council's Chemist, Mr. J. H. Coste, F.I.C., who is in the Department of the Medical Officer of Health. This report shows: (1) That the flueless gas-radiators were unable to raise the temperature, with windows and doors closed, at my table beyond 55·3° Fahr., and were therefore quite inadequate as a means of warming the Court. Also, that most of the heating by the radiators was not, as it should be, by means of radiant heat, but was provided by throwing overheated products of combustion into the Court. (2) That the radiators loaded the air with water vapour (known to be injurious to health) and carbon dioxide—ten times the normal amount. (3) That the radiators produced, and gave off into the air, an injurious and irritant gas, known as sulphur trioxide.

Another report, made at my request by Dr. Hurtley, places a different complexion on the matter. Its main essential fact is that it shows the presence of small quantities of carbon monoxide—a highly poisonous gas, which is a product of ordinary gas combustion, and gives rise to headache, lung irritation, and other symptoms like those developed by myself and my co-workers after sitting in the Court.

The gas-radiators have now been replaced by electric stoves; and so far as my Court is concerned, the matter ends. My unpleasant personal experience, however, may serve as a reminder to others whose duty requires them to sit in Courts of Law, that some part at any rate of the consequent malaise and sickness may be preventable, and that a skilled analysis of the air of the Court, and an examination of the means of ventilation and of heating, may disclose some remediable error.

Dr. Hurtley, in his complete and masterly report, says, *inter alia:* "Although the radiators had been in operation over four hours before my arrival, and for five-and-a-half hours by the time I left the Court, the temperature, with doors and windows closed—a door being opened occasionally—was only 52° Fahr. For a room in which a man has to sit still for three or four hours, such a temperature is far too low."

Concluding his report he says: "The heating arrangements of the Coroner's Court, Borough—

(1) *Are inadequate.* On a cold day it cannot raise the temperature above 52° Fahr. Such a temperature cannot be endured in comfort by people sitting still. A temperature of 65° or 66° Fahr. is required by people at middle age or above it.

(2) *Are Positively Harmful.* Into the air of that small room there are sent the products of combustion from 22 powerful bunsen burners. Even if the combustion is perfectly complete, we see that the air is being loaded with carbon dioxide and saturated with water vapour, and is also being contaminated to a small extent by sulphur dioxide.

It is now generally recognized that to breathe air practically saturated with aqueous vapour is always injurious. Carbon dioxide is not in itself injurious in the amount found in the room.

Sulphur dioxide is injurious, and its presence should not be tolerated. Carbon monoxide is excessively poisonous, and no risk—not even the remotest—should be run of introducing such a gas into the atmosphere of a room.

To conclude, the method adopted of warming the Coroner's Court at the Borough is absolutely wrong in principle. The warming ought to be effected by radiant heat, as by hot-water pipes and not by pouring the overheated products of the combustion of 22 bunsen burners into the room. I have said nothing about the diminution of oxygen brought about by such a method; but even that is unimportant compared with the other matters to which I have drawn attention."

(Signed) W. H. HURTLEY, D.Sc. (Lond.),
Lecturer on Chemistry, St. Bartholomew's Hospital.

N.B.—Previous to the analyses made by Mr. Coste and Dr. Hurtley, a fourth flueless gas-radiator fronting the Coroner's table (and under his very nose), formerly in use, had been removed.—F. J. WALDO.

The first of the juries' riders alluded to by Dr. Waldo was in these terms:

We complain of being obliged to sit for hours together exposed to chill and cold feet, due directly to the inadequate heating arrangements provided for us and others whose duty brings them to the City Coroner's Court. We place it on record that, notwithstanding the fact that the three open fires furnished for the heating of the Court were lighted at 7.30 o'clock this morning, the highest temperature attainable—as indicated by the thermometer in the centre of the Court—marks 48° Fahr. only. We would therefore suggest that a double row of hot-water radiators, with circulating boiler, similar to those recently furnished for the heating of the Special Treatment Centre adjacent to the Court at the City Mortuary, be forthwith supplied, with the view that a reasonable temperature of between 60° and 63° Fahr., be thereby attainable.

Subsequently, another jury passed a unanimous recommendation "requesting the City Corporation, without further delay, to warm the Court in an adequate, reasonable, and efficient manner." At the opening of the Court at 11 o'clock the temperature in the centre registered 48° Fahr. Later in the afternoon the temperature rose to 50° Fahr. The three open coal-fires provided for heating the Court were lighted at 7.30 in the morning.

Dr. Waldo adds that the three open coal-fires provided for the heating of the Court were lighted early on Friday morning (the 21st inst.); and kept up continuously through the night and following day. At 11 a.m. on the Saturday, the temperature registered at the Coroner's table was 51° Fahr., at 1.30 p.m. 53°, and at 3 p.m. 58°—the maximum attainable with doors and windows kept closed. During this time, the Court was filled with people.

Meter Hire.

SIR,—Under the Gas-Works Clauses Act, 1871, consumers are bound to consume, and undertakers to supply, gas by meter. Consumers must either pay for such meter and keep it in repair or "pay the rent of such meter if he desires to hire the same," the undertakers keeping it in repair. This is one side of the question, as here provision is made for either purchase or hire by the consumer. On the other side, there is no provision made for the supply of meters free of charge to consumers. The question thus arises, Are undertakers legally entitled to supply meters free of charge?

My point is this. Take, for example, a five-light meter, the present value of which is 4s. to 5s. per annum—say, 5s., as a handy figure. Take two consumers with such a meter, one consumes 120,000 c.ft., and the other (say) 10,000 c.ft. The cost to the undertakers is, in the first instance, ½d. per 1000 c.ft., and in the second 6d. The meter is of the same capacity for both consumers; but one makes fairly full use of it, while the other does not. Suppose the price of gas to be 3s., the meter value in the first case is equal to ½d., and the consumer is actually paying 2s. 11½d. per 1000 c.ft. for gas; while, in the second, the meter value is equal to 6d., and the consumer is paying 2s. 6d. actual per 1000 c.ft. for gas as such.

Can this be held to be preferential treatment of one class of consumer? If not, it must be coming very near it, as, while the nominal price of gas is a flat-rate, actually the smaller consumer is given a very considerable rebate in the shape of meter-hire as compared with the large one.

I have given quite a fair example; but, if necessary, the difference in actual practice could be shown in a much more exaggerated form. Hence my reason for asking an opinion as to whether or not it is legal to supply meters free, and whence the authority is derived for so doing under the circumstances indicated, which have every appearance of penalizing the large consumer for the benefit of the small one.

Dec. 22, 1917. "FAIRPLAY ALL ROUND."

Connecting Services to Mains under Pressure and Lowering an 8-Inch Main.

SIR,—Referring to the paragraphs on these subjects on pp. 603 and 605 of the "JOURNAL" for Dec. 25, it may be of interest to those using steel or wrought-iron mains to know that for some years past service connections to high-pressure wrought-iron mains have regularly been made in this district in the manner suggested, with a pressure of 5 lbs. in the mains.

A job of lowering a main very similar to that described as carried out at Omaha (Neb.) was accomplished here in 1902, when 500 ft. of 8-in. cast-iron main had to be put at a lower level, owing to the brow of a hill having been taken off in the course of road improvements. The maximum depth removed from the road was 4 ft. 9 in.

As the main was a leading one, supplying a whole district, it was desirable to make the alteration without interruption of the service.

This object was attained without having to cut the main at all, by opening the new trench close alongside the already exposed main, and moving the main gently into the new trench. All joints were then set-up. The length lost in straightening the original vertical curve was regained by the slight horizontal curve given, owing to the new trench being on one side of the main, not directly underneath.

P. P. CHANNON,
Engineer, Manager, and Secretary.

Haywards Heath, Dec. 29, 1917.

REGISTER OF PATENTS.

Manufacture, Utilization, and Combustion of Fuel.

No. 111,495.

HELPS, GEORGE, of Nuneaton.

No. 12,011; Aug. 24, 1916.

This is the first published of a series of patent specifications of the present inventor. He says: It has already been proposed to dilute coal gas more particularly with water gas; the coke obtained from a charge of coal being utilized to produce water gas—this mixture of coal gas and water gas having a calorific value of about 400 B.Th.U.; but it is believed that this has never been used commercially.

I have discovered that a great saving in fuel can be obtained if, in place of burning ordinary coal gas, which has a net calorific value of about 400 to 450 B.Th.U. per cubic foot, a gaseous mixture of a hydrocarbon gas with a diluent, such as Mond gas, producer gas, air, or nitrogen, and having a calorific value of about 400 to 250 B.Th.U. per foot is burnt.

The diluting gas may be blue water gas. But when pure blue water gas is the diluent, the dilution is preferably always carried as far as about 335 B.Th.U. net; and I am aware that in the manufacture of such a mixture the coke resulting from the manufacture of the gas has been used to generate water gas which has then been used as a diluent of the coal gas. But as far as I am aware, no such mixture has been prepared coming within the proportions claimed in this specification. Also, so far as I am aware, the mixture previously proposed was never manufactured or used commercially.

The dilution may take place by mixing coal gas and the diluting gas in the process of its manufacture as described in specification No. 14,750 of 1916, or in a machine which has a churning motion; or the gases may be made to flow together for some time through tortuous passages, or any other known method of mixing may be employed.

The main discovery is that gas of about 350 B.Th.U. net will in general use give as good a duty as gas of about 500 B.Th.U. net; and when such gas is burned in properly-constructed appliances, it will give a better duty than the higher grade gas—the main reason for the advantage of low-grade gas being that at the pressure at which gas is generally supplied from gas-works throughout the country only about 10-10ths to 15-10ths inches of water is usually available at the nipples of appliances when in use, and at such pressures the necessary primary air for the advantageous combustion of the gas is not injected into the burners.

Further, I have discovered that a low-grade gas such as I have indicated produces a coneless flame; and that the only efficient manner to apply such a flame for heating is by flame-contact in thin layers of the area and temperature required.

One incidental result of these discoveries is that, by dilution as described, all the difficulties of distributing a gas of regular quality (such as requires one constant and regular supply of air so essential to efficiency) are removed.

Hitherto town gas has been supplied of about 500 B.Th.U. per foot—requiring about five parts of air to allow of complete combustion. Such a gas is generally supplied at such a pressure that 2½ volumes of air are injected into the burner tube (primary air) and the remaining 2½ volumes are found as secondary air. The result is that the flame is a large one, having a comparatively large inner cone; and any object to be heated cannot be brought into intimate contact with such a flame, as it would interfere with the supply of primary air and secondary air, and thus much waste ensue through imperfect or retarded combustion. The vessel or article to be heated must be an inch or two away from such a flame, and the flame is cooled by the surrounding atmosphere.

If this same gas of 500 B.Th.U. be diluted with air before it reaches the nipple, so that its calorific value there is about 300 to 400 B.Th.U., and it is then consumed in a bunsen burner, the flame will not only allow of flame-contact, but will be hotter than a larger flame containing the same number of heat units. This is because the smaller flame is obtained by the perfect combustion of gas with a large proportion of primary air, whereas the larger flame is obtained with a smaller proportion of primary air, and the gas is probably imperfectly consumed. The result will be greater efficiency with the diluted gas than could be obtained with the richer gas. In this case, with close flame-contact, the vessel or object to be heated may be brought within 3-16ths inch of the burner head, and the thickness of flame should not be more than about ⅛th inch on the base of the vessel. The diluted gas will require only about 2½ volumes of air, two volumes of which it will take in probably at the nipple as primary, and about one-half volume as secondary.

To obtain the greatest efficiency in burning a dilute gas, the head of the bunsen burner is formed either with a plurality of holes close enough together for the jets to cover the burner-end and form a single coneless flame clinging or floating on the burner head, or the burner is made with a single annular orifice as described in specification No. 3042 of 1917.

When a burner containing a plurality of more or less circular orifices is employed, the orifices should usually be a distance apart of not more than twice their diameter; but, of course, this distance depends on the quality and pressure of the gas and the size of the orifices.

I am aware that a coneless flame is produced in some kinds of burners when burning ordinary gas at high pressure—say, 10 inches of water—but in this case the flame is stiff, and the force with which it strikes a metal object to be heated tends to destroy the object, and such a flame cannot easily be deflected and spread over a large area, which is not the case when a coneless flame is produced with a low-pressure diluted gas.

When burning the diluted gas in a flat-flame burner, little or no light will be given; but the necessary carburation may be effected *in situ* by benzolizing the gas or using albo-carbon.

Incandescent burners will generally give a better light per cubic foot used than with ordinary undiluted gas, because of the increased flame temperature. Gas-fires will give an increased radiating efficiency, due to the flame in contact with the radiants being hotter. Boiling burners will give an increased efficiency, due to better contact of the flame with the vessels. Oven burners will give an increased efficiency, due to the fact that the flame will be hotter, and less secondary air is required to enter the oven, and the products of combustion are therefore diluted to a less extent.

The economy and utility of this invention can be easily understood; for the cost of a cubic foot of a mixture of hydrocarbon gas and low-grade gases or air is considerably less than (say) coal gas; and, consequently, there will be economy if the efficiency of a cubic foot of the dilute gas in producing heat can be made to approximate to that of a cubic foot of coal gas, while if it can be made to equal it or be greater, the importance of the invention is inestimable.

In addition, cheaper methods can be devised of making a dilute coal gas than first making the coal gas and then diluting it. Blue water gas is the best diluent, because in it there need be no inert gases, and the flame temperature is high. The economy of using the diluted gas is shown by the following approximate comparison of figures. The bye-products shown, and the efficiency of the process, it is estimated, will, with improved practice, be considerably increased. Its effect on the conservation of the coal of the country is also enormous.

PRESENT GAS-WORKS PRACTICE.

Carbonizing Coal—Coke Making.

Coal carbonized, 15 tons.
Quality, good dry coal, very little dirt or ash.

				B.Th.U.
15 tons of coal at 30,000,000 B.Th.U. per ton . . . =				450,000,000
Result of Carbonizing.				
Tons.	cwt.	qrs.		B.Th.U.
2	10	0	150,000 c.ft. of straight coal gas of 600 B.Th.U.	90,000,000
10	17	2	Coke. 11½ cwt. per ton for sale 172½ cwt. of 13,850 B.Th.U. per lb. (dry coke), 3 cwt. per ton being used for carbonizing	267,600,000
	15	0	Tar. 10 galls. = 1-20th ton on 15 tons. 15 cwt. at 13,850 B.Th.U. per lb.	23,300,000
	15	0	Liquor. 105 lbs. per ton 105 × 15 = (say) 15 cwt.	—
	2	2	Differences—impurities removed in purifiers, washers, &c., and ash.	
				380,900,000
			Loss by difference	69,100,000
15	0	0		450,000,000
Analysis of Loss.				
			336 lbs. of coke used in fires . . .	—
			336 at 13,850 B.Th.U. per lb. . .	69,800,000
			say	70,000,000

SUMMARY.

70,000,000 B.Th.U. out of 160,000,000—*i.e.*, 70,000,000 + 90,000,000—have been expended to get a gas containing 90,000,000 B.Th.U.; and therefore 44 p.ct. has been lost, and the efficiency of the process is 56 p.ct.

If the proposition is looked at a little more broadly, it may be said that 3 cwt. of coke have been used in the producer to provide the heat necessary for obtaining 3 cwt. of gas out of 6 cwt.—an efficiency of 50 p.ct.

In this process, for every ton of coal 20 cwt. of coal is put into the retorts by special machinery; 14½ cwt. of coke is pushed out of the retorts by special machinery; 3 cwt. of coke is put into the producers by hand labour; 11½ cwt. of coke is conveyed in conveyors, quenched, elevated, screened, and stored in hoppers, loaded into trucks, boats, or carts, and, after being sold, delivered by rail, road, or canal.

PRACTICE ACCORDING TO THIS INVENTION.

Gasifying Coal—Gas Making.

Coal gasified, 15 tons.
Quality, good dry coal, very little dust and ash.
15 tons of coal at 30,000,000 B.Th.U. = 450,000,000 B.Th.U.

Result of Carbonizing.	B.Th.U.
1,150,000 c.ft. of 326 B.Th.U. . . . . =	375,000,000
Tar, 10 galls. 1-20 ton on 15 tons—15 cwt. at 13,850 B.Th.U. per lb.	23,300,000
Liquor, 105 lbs. per ton 105 × 15 (say) 15 cwt. . .	—
Coke, all converted into blue water gas	—
Loss in condensation of liquor 600 B.Th.U. per lb. 1,000,000, which is included in loss below, by difference	—
B.Th.U. in blow 110,000,000 of which 80 p.ct. utilized in raising steam usually blown into atmosphere .	88,000,000
B.Th.U. in hot gas (say) 15,000,000 of which 80 p.ct. is utilized in bringing temperature down to 300° Fahr.	12,000,000
Carried forward	498,300,000

Brought forward		498,300,000
Loss		85,700,000
		584,000,000
15 tons of coal		450,000,000
Steam. Water required 65,000 lbs. to make 1,000,000 c.ft. of blue water gas converted to steam at 120 lbs. per sq. in. needs 1160 B.Th.U. per lb. = 75,000,000 B.Th.U. in steam. Say efficiency of boiler 75 p.ct. the B.Th.U. required	=	100,000,000
		550,000,000
Utilized from the blow (see below) . .	88,000,000	
Extra fuel required	12,000,000	
B.Th.U. required to carbonize 15 tons of coal . .		34,000,000
34,000,000		
12,000,000 utilized in hot gas		
22,000,000 extra B.Th.U. required.		
		584,000,000

ANALYSIS OF LOSSES.

In blow	110,000,000	B.Th.U.
Extra required	12,000,000	
	122,000,000	
say 30 p.ct. loss . .		36,000,000
In hot blue gas and coal gas, the loss due to leaving the generator at a temperature of (say) 300° Fahr. 1,150,000 c.ft.		4,000,000
Radiation losses and Losses due to condensation of liquor, tar, oil, &c. .		45,700,000
		85,700,000

SUMMARY.

In the ordinary gas-works practice there is obtained by carbonizing 15 tons of coal in the gas 150,000 c.ft. of 600 B.Th.U. gas	90,000,000
In a coal gasifying process in which water gas is the diluent it is possible to obtain by gasifying 15 tons of coal 1,150,000 of 326 B.Th.U.	375,000,000

Four times the heat value of the gas; eight times the quantity of gas; there is no coke to sell; the coal is handled once to the gas generators (it is sent out for sale through mains); in use, the efficiency of gas as compared with the solid coal is enormously enhanced. The efficiency of the process is 83 p.ct.; coal gas costs (say) 1s. per 1000 c.ft. into the holder, and as a 350 B.Th.U. gas costs 3d., and the efficiency of the two gases even then would be only proportional to their calorific value, the lower grade gas would allow the consumer to have 190 p.ct. more B.Th. U. for his penny on the basis of cost price than would the higher grade gas.

Thus 500 B.Th.U. gas at 1s. per 1000 c.ft. = 500,000 B.Th.U. for 1s. or 41,666 for 1d., 350 B. Th.U. gas at 3d. per 1000 c.ft. = 350,000 B.Th.U. for 3d. or 116,666 for 1d. 116,666 − 41,666 = 75,000 more B.Th.U. for 1d., or 190 p.ct.

The diluted gas may be advantageously employed for steam-raising in boilers, due to the low price at which it can be supplied for such a purpose; and the small waste of heat involved by its use allows it to be employed with advantage in many cases in which coal is now employed. In this manner not only is smoke entirely avoided, but the bye-products, instead of being destroyed in the green coal, are recovered.

Gases diluted to bring them to about 400 to 250 B.Th.U. may also be utilized with great efficiency in internal combustion engines, because it is possible to considerably reduce the excess of air over the theoretical requirements; for it will easily be seen that it is more difficult to supply and intimately mix the correct quantity of air for complete combustion with a gas requiring ten volumes of added air than it is with a gas which is diluted to require only about two volumes for example.

As before stated, I am aware that coal gas has been diluted to an extent not falling within the scope of this specification; and I am aware that specifications have described processes for the manufacture of mixtures containing coal gas and pure blue water gas having a calorific value of about 400 B.Th.U. It has, however, never been suggested that a gas diluted with (for example) air, of a calorific value of about 400 B.Th.U. net, could give greater heating efficiency than was obtained with gas of (say) 500 B.Th.U. net; or that a gas diluted with pure blue water gas, and having a calorific value of about 350 B.Th.U., could give greater heating efficiency than was obtained with gas of (say) 500 or more B.Th.U. net, when used at ordinary pressures with ordinary appliances. Still less was it known that gas falling within the scope of the specification would, on burning, produce a high temperature coneless flame at low pressures, and so allow close contact of the flame with the object to be heated—thus giving increased efficiency of about 25 p.ct.

Price of Gas in the Wandsworth Area.—The Wandsworth, Wimbledon, and Epsom District Gas Company have raised the price of gas a further 3d., to 3s. 1d. per 1000 c.ft., for consumers in the Wandsworth area. In pre-war days, the charge was 1s. 9d. per 1000 c.ft.

War Bonus at Dewsbury.—The Dewsbury Town Council have decided that all weekly wage earners in the Corporation employ, except the police and those in the electricity department—for whom separate arrangements are made—shall receive, as from Dec. 5, a war bonus equalling 15s. per week above pre-war wages, including a previously granted 10s. For male workers under 21 years of age and for female employees, the bonus is to be 10s. per week above pre-war wages, including 7s. previously granted.

ON account of the pressing need for Gas Heating Apparatus, especially Gas Steam Radiators for Munition Works, and the shortage of material and labour, we should be pleased to hear from customers having apparatus for disposal of recent manufacture out of use through shortage of gas supplies or other reasons.

R. & A. MAIN, LTD.,

WORKS: Gothic Works, EDMONTON, N; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.
SHOW-ROOMS AND BRANCHES: 25, PRINCES STREET, OXFORD CIRCUS, W.; 136, Renfield Street, GLASGOW; 83, Old Market Street, BRISTOL; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY, N.S.W.

MISCELLANEOUS NEWS.

COAL CONSERVATION IN ENGLAND.

Electricity for the Nation.

One of the most far-reaching suggestions towards national reconstruction is set forth in an Interim Report made to the Ministry of Reconstruction by the Coal Conservation Sub-Committee. The report has now been issued to the public with the following preface written by Dr. Addison.

"This report, which was presented to the Reconstruction Committee, is issued for the information of the public, and in the hope that the very important matters with which it deals may receive adequate consideration at the hands of all those likely to be affected by its proposals. It will be observed that important issues affecting municipalities and public bodies are raised in the report; and they will be explored in all respects by the Government before any action is proposed to Parliament upon the subject. In its legislative aspect, the whole matter is being investigated by a Committee appointed by the Board of Trade, and presided over by Sir A. Williamson, M.P."

The Sub-Committee propose briefly, to supply all our industries with electrical power generated at large "super-power stations," not more than sixteen in number for the whole country, and to eliminate or combine all smaller stations.

The primary object of the scheme is to economize our coal supplies. The amount of coal used in the United Kingdom for the production of power is said to be 80,000,000 tons, at a cost of (say) £40,000,000 at the pithead. The Committee confidently state that, by an up-to-date and national scheme of electrification, 55,000,000 tons of this (£27,000,000 a year) could be saved. This, with a saving of the bye-products now wasted by the burning of coal in open grates and boiler furnaces, would effect a national economy of £100,000,000 a year.

The most economical way of obtaining power from coal on a large scale is by generating electricity from it. The coal now used, the Committee say, would, if used economically, produce at least three times the present amount of power. An increased use of power is of the highest importance to the future prosperity of the country. It is the best way to increase the net output per head, and, therefore, the prosperity of the worker. "The best cure for low wages is more motive power."

In the United States the amount of power used per worker is half as much again as in the United Kingdom. Leaving out of consideration workers in trades where the use of power is small or even impossible, it is probably nearly double what it is here.

It has been settled conclusively during the past fifteen years, the Committee state, that the most economical means of applying power to industry is the electric motor. In the factories put down for the production of munitions during the war, 95 p.ct. of the machinery is driven by electricity; and it is only a question of time for all power to be applied in this way. The problem is not how to apply electric power, but how best to generate it.

The development of electricity in this country has been hindered by the number and the smallness of the electrical undertakings. At the present time the supply of electricity in Great Britain is split-up among about six hundred companies and municipal undertakings. The average generating capacity of such of these undertakings as possess power stations is only 5000 H.P., or about one-fourth of the capacity of one single generating machine of economical size, and about one-thirtieth of that of a power station of economical size. Technically and commercially, the big generating station is admittedly the best.

The reform proposed by the Committee is to supersede all these small undertakings by laying down throughout Great Britain main trunk lines to be fed by some sixteen "super-power stations." The generating machines in these stations should be of large size—not less than 20,000 H.P. each. In more important industrial districts machines of as much as 50,000 H.P. might be used with even greater advantage. The generating stations should be on large sites with ample coal and water transport facilities. It is contemplated that at each generating station bye-products might be extracted from the coal before it is used for the production of power, and that various electro-chemical processes which are essential for the country should be carried on near by. The sites for the stations must be outside, not inside, towns. This would improve the health of the great industrial centres by the reduction of smoke, and would relieve the congestion of the railway lines in their neighbourhood by practically abolishing the carriage of coal.

Various forms of electricity supply authority, both public and private, are considered; but the Committee, on the whole, favour private enterprise. They are "impressed with the special need for initiative and resource in the management of the business of power supply; and they are of opinion that the freedom of range and keenness which are distinctive of private enterprise will be found to be in a high degree conducive to the fullest measure of success."

The sixteen great power authorities—whether private companies or public bodies—would be controlled by a National Board of Electricity Commissioners. Existing plants would be handed over on equitable terms to the new authorities. In addition to the main generating stations, subsidiary generating plants would be set up wherever there was surplus gas or waste heat, as at blast-furnaces and coke-ovens; and the electricity so generated would be fed into the main-trunk system. In the same way, waste coal, which is not at present worth the cost of carriage, and is therefore left at the pits, could be used on the spot.

There already exists in this country a practical example of centralized production of electricity for a large area. The North-East Coast district (rather larger in area than Lancashire) is served by a

Gas Furnaces

For all Heat Treatment Operations.

¶ Gas undertakings are invited to avail themselves of the completely equipped FURNACE DEMONSTRATION PLANT installed as a Special Department at the Luton Works of The Davis Furnace Company.

¶ Appointments for furnace users to visit can be arranged at short notice.

The Davis Furnace Company, Diamond Foundry, Luton.

(Proprietors: The Davis Gas Stove Co., Ltd.)

group of power companies from one inter-connected electrical system. The population of this area is less than that of Lancashire; and the area is, therefore, less advantageous for electrical supply. But, whereas in Lancashire, with its multiplicity of electrical undertakings, the price per unit for electric power varies from 1d. to 2d. or more, the average price paid in the North-East Coast district is less than ½d. a unit; and the use of electric power per head of the population is three times as great. A great saving of coal and a reduction of smoke has resulted. Apart from the electric-power companies' consumption, practically no coal is burnt on the Tyne for power purposes, except by the railways and some collieries. The Tyne shipyards may be said to have adopted electricity to the exclusion of all other forms of power. As a result of the adoption of electric traction on the suburban railways, the traffic facilities of the district are greater than those of any other district of similar size. New industries have been established in the district, solely on account of the cheap electric power available. Waste heat and gases have been extensively used for the production of electricity; so that electric power is produced as a bye-product of two of the largest local industries—the making of pig-iron and coke. These local generating stations are commonly called "waste-heat stations." The first was erected in 1905, and there are now eleven at work.

The Committee foresee, as a result of a national system of electric-power supply, a great increase in the use of electricity for all purposes, with many advantageous results. Factory chimneys would gradually disappear. Railways would be electrified, even for the haulage of goods trains. Smoke would disappear from our towns, and coal-wagons need run no farther than to the electric-power stations. Electric light would be cheap enough for the poorest; and there would be a large increase in the use of electric heat and power for household purposes.

As showing the importance of the scheme, the report says: "It is scarcely possible to exaggerate the national importance of a technically sound system of electricity supply, because it is essentially one with the problem of the industrial development of the country. The development of such a power system may be likened to the development of the railways of a country; and it is just as impossible to secure economical power generation and supply by each municipal area working independently (which is the position to-day) as it would be to have an efficient railway system if each municipal area owned its own lines, and long-distance transport were provided for by running-power agreements. History shows that, in the early stages of railway development in this country, exactly the same process of amalgamation had to be gone through."

The main specific recommendations of the Committee were given in last week's issue of the "JOURNAL," p. 614.

RATES AND CHARGES IN VARIOUS TOWNS.

Annual Comparative Statistics.

There has come to hand from Mr. W. Allison Davies, the Borough Treasurer of Preston, a copy of his annual comparative statement with regard to the charges made for gas, electricity, and water, and profits and losses on municipal undertakings, together with the rates levied, in a number of Provincial towns and some Metropolitan boroughs for the year 1917-18. The present is the thirty-third annual statement; and it embraces particulars in connection with a total of 138 different places. This is two more than in the preceding year; other additions having been counterbalanced by omissions. For one blank, at least, on this occasion—that alongside the name of Yarmouth—the explanation of "special war conditions" is given; and in other instances abnormal conditions must largely interfere with comparisons.

Glancing down the list of towns included in the tables, it is seen that the populations range from 900,000 in Birmingham down to 11,973 in the case of Mossley, and 12,000 in Clitheroe and Kendal. With reference to rateable value, the highest figures shown are Westminster (£6,958,017), Liverpool (£5,073,691), Birmingham £4,913,185), Manchester (£4,855,191), Kensington (£2,445,070), Leeds (£2,210,971), Sheffield (2,106,879). At the other end of the scale are Clitheroe (£53,310), Mossley (£66,270), Kendal (£70,916), Newark (£80,018), King's Lynn (£86,699), Brighouse (£88,573), Bacup (£89,536), Haslingden (£90,565), Ilkeston (£91,360).

The towns which are rated at 9s. or over in the pound are: West Ham, 12s. 9d.; East Ham, 11s. 5d.; Halifax, 11s. 4d.; Merthyr Tydfil, 11s.; Stoke, 10s. 10½d.; Norwich, 10s. 8d.; Walsall, 10s. 7d.; Batley and Lowestoft, 10s. 4d.; Ashton-under-Lyne, 10s. 3½d.; Bacup and Stalybridge, 10s.; Colchester, Heywood, and Rotherham, 9s. 10d.; Sheffield, 9s. 9d.; Hull, 9s. 8½d.; Brighouse and Ilkeston, 9s. 8d.; Preston, 9s. 7d.; Birmingham, Colne, and Rochdale, 9s. 6d.; Chesterfield, 9s. 5d.; Harrogate, Keighley, and Warrington, 9s. 4d.; Southampton, 9s. 3½d.; Bradford, Mossley, and Stockport, 9s. 3d.; Nelson, Swansea, and Wolverhampton, 9s. 2d.; and Leeds, Northampton, Swindon, and West Bromwich, 9s. On the other hand, there are in the list only two towns which are still rated at 5s. or less in the pound—Blackpool, 5s.; and Oxford, 4s. 7d.

By transfers from municipal undertakings, &c., the rates levied in the following towns have been reduced to the extent of 1s. or more in the pound: Liverpool, 1s. 4d.; Wallasey, 1s. 3d.; and Halifax, 1s. 1d. At the other end, profits equal to 1d. in the pound or less were contributed at: Bournemouth, Burnley, Colne, Crewe, Darwen, Richmond (Surrey), and St. Helens, 1d.; Bacup, Canterbury, Harrogate, Northampton, Wigan, Worcester, and York, ½d.; Accrington, Hove, Luton, Nuneaton, Stockton-on-Tees, West Hartlepool, and Widnes, ¼d.; and Birkenhead, Croydon, Heywood, Middleton, Kingston-on-Thames, ¼d. The 138 places include upwards of thirty in which the rates were not

To all Readers of the "Gas Journal"—

GREETING!

1917 has run its course; we have tried to faithfully fulfil our obligations to our customers, while honourably accepting our full share of the direct War-work which the nation demands.

1918 will doubtless bring enhanced difficulties for the whole Industry, but with a continuance of that co-operation which has solved so many of the War-time problems, and with a confidence born of the experience of the past, we extend the familiar wish:

A Prosperous New Year.

THE RICHMOND
GAS STOVE & METER CO., LTD.

reduced by profits from municipal undertakings; but in some of these instances (as well as in others referred to above) profits so made were carried to reserve.

As has been the case on previous occasions, in some of the towns named there were on certain municipal undertakings deficiencies which were met by an increase in the rates. In all, there were 74 cases of this kind (as compared with 68 in the return immediately preceding), some of them relating to towns in which at the same time other undertakings were able to reduce the rates. The three largest amounts figure under Birmingham (£74,186), West Ham (£64,672), and Preston (£57,720); the main cause in the case of West Ham being a loss on the electric light undertaking. There are no losses shown under the heading of gas; but, of course, water undertakings figure largely. In the matter of electric lighting, there are seventeen cases of deficiency mentioned; the largest sums being involved at West Ham (£35,500), Hastings (£7298), Kingston-on-Thames (£6790), Lowestoft (£5000), and Accrington (£4560). In regard to Lowestoft, it is pointed out that the loss was "due to special war conditions." The amounts in the pound by which the rates were increased by these deficiencies totalled 1s. or more in the following instances: Preston, 2s. 8½d.; Bacup, 2s. 4½d.; Harrogate, 1s. 11½d.; Heywood, 1s. 5d.; Stockton-on-Tees, 1s. 3½d.; West Ham, 1s. 0½d.; Stockport, 1s. 0½d.; Halifax, 1s.

Turning now to the charges made for gas and electricity in the various towns that are included in the list, it is seen that there are three places named in which the net charge per 1000 c.ft. for a domestic supply of gas for lighting purposes is 4s. or more. At Lowestoft, the rate is 5s. 1d.; at Nuneaton, 4s. 2½d.; and at Swindon, 4s. As mentioned, the figures named are for domestic lighting supplies; and in numerous instances large consumers, power users, &c., come under different scales. According to the table, domestic lighting supplies are furnished at less than 2s. per 1000 c.ft. at Widnes, 1s. 6d.; Sheffield, 1s. 9d.; and Sunderland, 1s. 9d. Supplies at 2s. per 1000 c.ft. are to be had at Middlesbrough.

As to electricity, the charge per Board of Trade unit for a domestic lighting supply ranges from 9d. downwards; the towns where the figure is over 6d. per unit being: Bromley, 9d.; Chatham, 8d.; Hastings and Kingston-on-Thames, 7½d.; Kendal, 7½d.; Oxford, 7¼d.; Bournemouth, Hove, Northampton, Southampton, 7d.; Leamington, Worthing, and Kensington, 6½d.; and Ealing, 6¼d. The charge is 3d. per unit at Hammersmith, and 3½d. at Burnley and Bury.

In the case of Mr. Davies's own town, Preston, the rates are 9s. 7d. in the pound. Out of receipts from municipal undertakings, the rates are relieved to the extent of 4½d. in the pound; while deficiencies on other undertakings resulted in the rates being increased by 2s. 8½d. in the pound. The price of gas at Preston for domestic lighting is 2s. 10d. per 1000 c.ft.; and of electricity, 5¾ per unit.

Having no coal, the Trieste Gas-Works have, says "The Times," been forced to shut-down, leaving the city in darkness.

THE SHEFFIELD GAS CONSUMERS' ASSOCIATION.

A Meeting has been held, in the Cutlers' Hall, Sheffield—Mr. W. CLARK, presiding—at which the business was to discuss the desirability of organizing an Association for the purpose of watching the interests of gas consumers and disseminating information with regard to improved methods and appliances. By a unanimous vote, it was decided to form the Sheffield Gas Consumers' Association.

The CHAIRMAN said that the present inadequate supply of gas was a matter of gravity in regard to manufacturing purposes. Some firms were having difficulty in producing steel for Government orders; and these difficulties would increase if they had to increase their output of certain classes of steel. It would be the duty of the Association, if formed, to inform themselves of what the Gas Company had done to provide for the increasing demand for gas. Another aim of the Association would be to disseminate information with regard to improved methods and appliances. He hoped there would be on the Committee experts whose advice and help would be of the greatest value. If the Association was conducted in the right way, it would do good work for all gas consumers and manufacturers of the city.

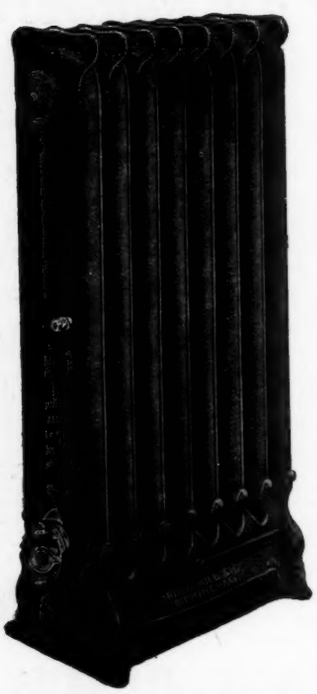
Mr. D. FLATHER, in moving a resolution that the Association be formed, outlined the objects. First, he said, they were out to obtain efficiency in the use of gas for commercial purposes, and to receive and circulate official reports of all gas tests. It was also necessary to watch the interests of consumers, and to try to remove causes for complaint between them and the Gas Company. The Special Sub-Committee of the Chamber of Commerce had been considering the question from all standpoints, and had come to the conclusion that nothing short of an Association of consumers would be effective in dealing with the matter. Metallurgy, engineering, and other departments of industry were fully catered for, but the question of gas appliances and gas using were only touched upon in a cursory fashion. Everybody was beginning to realize that combination was a better way than competition; and he hoped they would combine for the best interests of all. They wanted to disseminate information to those interested in the use of gas; and in this way they might prevent the bombardment of the Gas Company by individuals. Most of the firms of the city were more or less dependent at the present time upon the supply of gas for carrying on. It was of vital importance for the manufacture of those high-class alloy steels which were so much desired for aeroplane work, &c. The Association did not start out as an offensive body against the Gas Company. They started with a firm resolution to put things on a sound and proper basis, and might be called upon at any time to act against or for the Gas Company. It did not matter which it was. They were out to secure the supplies of those vital steels now being called for.

Mr. W. TYZACK wanted it made plain that, though he joined the Association, it was not in a hostile spirit. There was a shortage of

THE "MARS"
- - GAS-HEATED STEAM - -
RADIATOR

THE "Acme" of perfection in heating, it is entirely self-contained and requires no steam or water connections. The heat is regulated by an automatic gas-valve, an even temperature is maintained, and consumption of gas economized. It is flueless and odourless. Quite simple and cheap to instal, its maintenance cost is low, and it heats a room with less gas than is required to light it. Ideal for large offices, workrooms, halls, churches, and public institutions.

Write for Special Booklet, "Healthful Heating," to
ARDEN HILL & Co.
"ACME" WORKS - - BIRMINGHAM.


DOUBLE-COLUMN RADIATOR.

man-power, of first-class power; and the army wanted men as well as the Gas Company. The Company had done well for Sheffield in the past—giving good gas at cheap cost, which was very acceptable. He emphasized that nothing was done in a hostile spirit.

The CHAIRMAN said the Association had not been formed in a hostile spirit; but they could not help thinking that the Gas Company had not done all they could in regard to man-power.

The resolution having been carried, the following gentlemen were appointed a Committee to draw-up rules: Messrs. P. B. Henshaw (Kayser Ellison), R. E. Skeggs (Vickers'), P. B. Brown (Hadfield's), D. Flather (W. T. Flather), J. C. Ward (Edgar Allen), Skelton and Fawcett (Brown's), P. Macgregor (Sanderson Bros. and Newbould), and J. Madden (Cammell's), with Mr. D. Flather as Acting Secretary.

GAS FOR MOTOR VEHICLES.

The Local Government Board have withdrawn the regulation as to the limit of speed of five miles an hour of heavy motor vehicles drawing a gas-container trailer which does not exceed in weight 15 cwt., and having its wheels fitted with rubber tyres. The new order is for the period of the war and twelve months after.

It is stated that the application of the Eastbourne Town Council to use compressed gas in steel cylinders for the propulsion of the Corporation motor omnibuses has been refused by the Board of Trade.

The new Motor Gas Equipment Association is making good headway; propaganda and other work having already been taken up. Among other things agreed to at a recent committee meeting was a resolution to approach the Motor Trade Association with reference to a special scheme of price-maintenance for gas-bags. The offices of the Association are at No. 7, Sackville Street, Piccadilly, W.

In an article on the "Coal-Gas Situation," in which are given some facts and figures concerning the prospects for motor transport, the "Commercial Motor" says: It is as well to regard the coal-gas issue, as it stands to-day, fairly and squarely. The troubles are increasing, not diminishing; and it behoves the motor user, running on coal gas, to exercise just as much care in the consumption of his fuel as he would were he condemned to rely upon petrol at its current price. Wastage must be cut down to an absolute minimum. There is the tendency—quite natural—owing to coal gas giving results equal to petrol, but at one-half to one-third of the cost, to be careless and wasteful. It is an abhorrent practice, and is likely to force the authorities to drastic action far more quickly than the mere increase in the number of vehicles embracing this fuel. Is it possible to look for any alleviation of the situation? Certainly. Coal gas is being used to-day for a thousand and one industrial purposes for which producer gas would do equally well. The use of gas as an illuminant should be discouraged. . . . We are only just beginning to learn the incalculable value of waste. Instead of harassing commerce in all directions, as is the tendency to-day, especially in matters pertaining to motor transport, which is playing an invaluable part in keeping the country going, by threatening, or even considering, proposals to circumvent "carrying on," it would be more profitable to devise ways of turning other contributory sources of gas to useful account, and to discourage the utilization of the commodity in all instances—such as lighting—when an equally inexpensive rival is available.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Dec.* 31.

There is no particular change to record in the tar products market since last week. Further business has been done in pitch, and the price of the article is well maintained. Solvent naphtha continues steady at the price last recorded, of 4s. 6d. per gallon, net and naked, at makers' works. The position of other tar products remains unaltered.

Sulphate of ammonia for home agricultural purposes is still in demand; but makers in the South are very fully committed for some little distance ahead.

Tar Products in the Provinces.

Dec. 31.

Markets for tar products remain about the same.

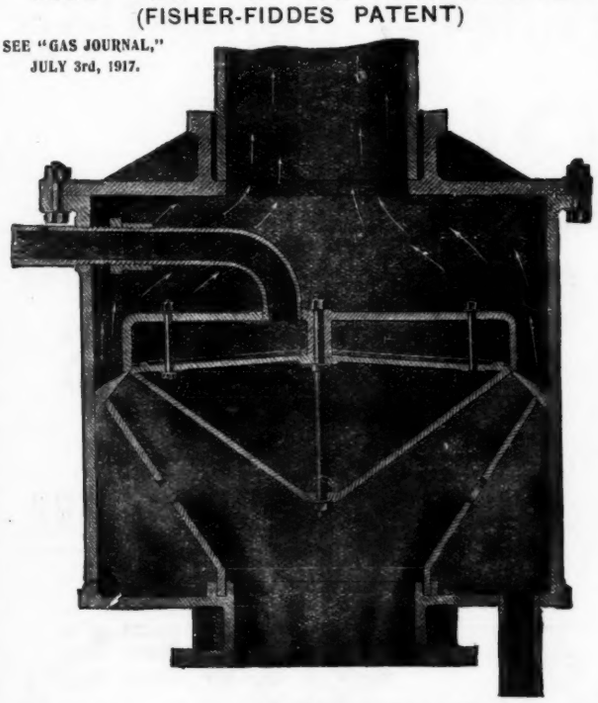
The average values for gas-works products during the week were: Gas-works coal tar, 27s. to 31s. Pitch, East Coast 20s. to 25s. per ton; West Coast—Manchester 18s. 6d. to 19s. 6d., Liverpool 19s. 6d. to 20s. 6d., Clyde 19s. 6d. to 20s. 6d. nominal. Benzol 90 p.ct., North, 10½d. to 11½d.; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North 7¾d. to 8¼d. Solvent naphtha, naked, North, 3s. 8d. to 3s. 10d. Heavy naphtha, North. 1s. 10d. to 2s. Creosote, in bulk, North 3¾d. to 4¼d. Heavy oils, in bulk, North 4¼d. to 4½d. Carbolic acid, 60 p.ct. East and West Coasts, 3s. 4d. naked. Naphthalene salts, 80s. to 90s., bags included. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

FROM A MARKET CORRESPONDENT.

Tar Products.

There is practically no change to record in the market position of tar products since the last report; business during Christmas week having been very quiet indeed. With the coming of the New Year, however, more than one important development—not necessarily productive of business—is to be looked for. Pitch maintains a firm tone

"TAR FOG" & TAR EXTRACTOR
(FISHER-FIDDES PATENT)
SEE "GAS JOURNAL," JULY 3rd, 1917.



FOR THE
ELIMINATION OF
TAR & TAR FOG
FROM COAL GAS AND
OIL VAPOURS
FROM C.W. GAS
WHY NOT TRY THE
NEW METHOD
AUTOMATIC
EFFECTIVE &
INEXPENSIVE
PARTICULARS AND PRICES FROM
R. & J. DEMPSTER, LTD., MANCHESTER.
LONDON OFFICE: 34, VICTORIA STREET, WESTMINSTER, S.W. 1.

at 48s. to 50s. per ton f.o.b. London, although shipping facilities have recently been more difficult to obtain, and the quantity shipped has been rather less than was hoped for. In the Provinces, the demand has certainly increased for home consumption. It is reported that the difficulties of blending pitch with fuel oil are practically overcome; but some trouble has arisen in using the mixture. This need cause no anxiety, so it is generally thought. Solvent naphtha remains very strong at 4s. 3d. Efforts are being made in certain quarters to force the price up still higher; but some of the older manufacturers are quite satisfied with the present basis, and consider these efforts as against general interests. The all-important question now is whether the Government are going to regulate prices and/or deliveries of this product, as has been rumoured of late. Heavy naphtha is very firm at 3s. 3d. per gallon, which also is considered quite high enough for the present. Naphthalenes are steady at late rates; cheaper crudes being particularly in request. Cresylic acid is firm round about 2s. 9d. per gallon, at which figure it will probably not remain long. Benzol and toluol are nominal. Carbolic acid is hardly mentioned; and creosote oil (gas coal tar) is not on open offer, owing to the requirements of the Ministry of Munitions.

Recent advices from America indicate that the Government are taking measures to increase the output of toluol for making trinitrotoluol for war purposes. At present the production is at the rate of 11 million gallons per annum; but this will be increased as rapidly as possible. The greatest increase is expected to come from the utilization of city gas plants, of which there are 72 available for the recovery throughout the country, as every bye-product coke-oven plant in the States has arranged to produce toluol to its utmost capacity. In other directions, a special census of the coal-tar industry, as authorized by the Tariff Act, is to be undertaken by the Tariff Commission, who will make a detailed inquiry regarding the development in the United States of the complex chemical industries which convert coke-oven bye-products into finished dyes, medicinals, flavours, synthetic phenolic resins, photographic chemicals, &c. According to recent returns, more than 150 concerns are now engaged in such manufactures in the United States.

The range of home prices is as follows:

Aniline Oil (pure): 1s. 2d. per lb.

Benzol: 90% London, 1s. 0½d., North 10½d. to 11½d.; 50% North 1s. 4d. to 1s. 5d. naked per gallon.

Carbolic Acid: 60% East and West Coast 3s. 6d. per gallon; crystals 40% 1s. 3d. per lb.

Crude Tar: London 30s. to 35s., Midlands 25s. to 26s.; North 26s. per ton, *ex* works.

Pitch: London 48s. to 50s. f.o.b.; East Coast, 22s. to 24s. f.o.b.; West Coast—Liverpool 22s.; Manchester 22s. to 23s. f.a.s., Clyde 22s. to 24s.

Solvent Naphtha: Naked London 90-190% 3s. to 3s. 3d.; North 2s. 9d. to 3s. per gallon; 90-160% naked London 4s. 3d. to 4s. 6d.; North 4s. to 4s. 3d. per gallon.

Crude Naphtha: Naked 30% 8¼d. to 8½d.; North 6¼d. to 6½d.

Naphthalene: Refined £32 10s. to £35; salts 80s., bags included.

Toluol: Naked, London 2s. 4d.; North 2s. 3d.

Creosote: Nominal, London 4¼d.; North 3⅞d.; heavy oil, 4½d. per gallon in bulk.

Anthracene: "A" quality, 40-45%, 4½d. per unit; "B" quality, 1⅞d. to 2¼d.

Cresylic Acid: 95%, 2s. 7d.; 97-99%, 2s. 8d. to 2s. 9d. *ex* works London and f.o.b. other ports.

Grease Oils 18° Tw. (naked) £6 per ton f.o.r. makers' works.

Sulphate of Ammonia.

A good demand is still maintained; orders being satisfactorily booked for delivery over the next four months. From all appearances, it is going to be a difficult matter to deal with all the orders coming to hand. The official maximum price for agricultural purposes is now £16 7s. 6d. per ton delivered; and although this is the highest paid by consumers since the Government fixed prices of sulphate, farmers have no cause for complaint, as manufacturers are making practically no profit even at this figure. Had the law of supply and demand been in operation, instead of the fixed maxima, it is conceivable that considerably higher prices would have been charged. Makers have had many difficulties and disappointments during the past year, and it is not easy to see whence any improvement can come during the year now commencing. Working expenses must of necessity increase, for labour will be scarcer; while transport difficulties will certainly not diminish. The only chance of counteracting these troubles is by obtaining from the Government still higher quotations when future maximum prices are fixed; and several weeks will elapse before this can happen.

Wages and Output at Morecambe.—At the meeting of the Morecambe Town Council last week, on the submission of the Gas Committee's minutes, Councillor Birkett complained that while an increase of 25 p.ct. was shown in the Gas Department wages, that of output was only 9 p.ct. on the month, though they had been promised substantial reductions in wage expenses by the installation of the new mechanical stoker. The wages bill was still advancing. Councillor Ellis held that if there was an increase in electricity prices there should be an increase for gas, as the increased cost of coal applied to both. There had been a deficit last year on the Gas Department of £1200, and nearly £4000 was owing to the bank; yet not a word was said about raising gas prices. Councillor Knowles (the Chairman of the Gas Committee) said the advance of both gas and electricity prices had been raised in the Finance Committee. The gas wages had not advanced 25 p.ct.; but whatever the rise was, the Committee were powerless. Workers went to the munition works for higher pay. As to the mechanical stoker, the consequences would have been serious but for its installation; and he doubted whether the works could have been run at all without it. The minutes were approved.

Our Special Quick-Connecting

COUPLING

is the easiest and most simple method of connecting

GAS CONTAINERS for MOTOR VEHICLES

Specially recommended by the

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

SOLE MAKERS:

SAWER & PURVES

(BRANCH OF METERS LTD.)

Nelson Meter Works, MANCHESTER.

Radford Meter Works, NOTTINGHAM.

Lighting Restrictions.—There has been added to the Defence of the Realm Regulations a new one, giving the Minister of Munitions authority to restrict lighting in any area and within such hours as he may direct, with a view to maintaining or increasing the supply of light, heat, and power for the purpose of the production, repair, or transport of war material, or any other work necessary for the successful prosecution of the war.

A One Night Public Lighting Suspension.—At Bingley, Yorkshire, for one night just before Christmas, street lighting was suspended—a fact which much surprised the inhabitants, as the street lighting is better this winter than hitherto since the war—owing to the daily consumption during the darkest week of the year having exceeded the daily make of gas, and the reserve had got so low that the situation became acute, and the sudden economy was unavoidable. Fortunately, it was for one night only.

Output of Sulphuric Acid in Japan.—The British Commercial Attaché at Yokohama says it is estimated that the rate of production of sulphuric acid in Japan at present is some 582,500 tons per annum. Of this quantity, about 421,000 tons are consumed by manufacturers in the production of sulphate of ammonia, hydrochloric acid, &c., leaving 160,000 tons available for general requirements in the country, which are about 100,000 tons a year. Thus there are about 60,000 tons available for export. It is estimated that the output of sulphuric acid in Japan, if continued at the present rate of production, will be 100,000 tons in excess of the demand on the resumption of normal conditions.

Volunteer Gas Workers in Australia.—The "Sydney Mail" dated Sept. 19 last, a copy of which is just to hand from Mr. R. J. Lukey, contains a series of photographs of operations as they were carried on at the Mortlake works of the Australian Gas Light Company, during the great strike of miners and other classes of labour. When the employees of the Gas Company refused to handle "black" coal, their places were filled by over 400 volunteers, who speedily settled down to work, with excellent results. A camp was established at the works, under the control of the Assistant Secretary (Mr. Gurnett), the general arrangements being made by the Engineer (Mr. Andrew Wilson). Cordial acknowledgment was made by the Company of the services of the volunteers, as by their action a situation involving most serious consequences had been avoided.

An Old Suggestion for Economizing.—In the "Westminster Gazette," a letter signed "C. E. S." remarks that "for at least one week in the month during bright moonlight the obscured gas and electric lights are absolutely useless, the light from them probably not adding 1 p.ct. to the total illumination. There are now many thousands of lamps burning fourteen or fifteen hours every night, at a time when we are told that economy in the use of both gas and coal is of vital importance to the country. What encouragement is there for private economy from the action of public bodies, who waste every day more gas than a single individual uses in a lifetime?" The evening on which this letter appeared [Friday] afforded in London excellent proof of the unwisdom of placing absolute reliance on what the moon should provide in the form of illumination.

Halifax Alarmed at War Wages.—The Halifax Corporation War Wages Committee have declined certain applications for wage increases, and have passed the following resolution for submission to the Town Council: That the Halifax Corporation view with alarm the continual applications for increases of wages and war bonus from the employees engaged by corporations and other public bodies, seeing that the rates of increase of wages already given are, in the opinion of this Corporation, in excess of the actual increased cost of living; while continual accretion of the wages bill is tending to create embarrassment of municipal finance, as well as to produce unrest in other sections of the community. Further increases will compel corporations to have recourse to State assistance; and this Corporation urge the Government to give the matter their earnest consideration, and at the same time to give instructions to the Committee of Production that, in deciding any future applications, the Committee must fix a time limit within which no further applications should be considered; and, further, that a copy of this resolution should be forwarded to the Prime Minister, the Chancellor of the Exchequer, the President of the Local Government Board, the local Members of Parliament, and also to the various county borough councils in the West Riding, asking such councils to pass a similar resolution and forward the same to the Government Departments and to the local Members of Parliament.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Dec. 28.]

Nos. 18,702—19,041.

BENTLEY, W. H.—"Gas-storage apparatus for motor vehicles." No. 18,765.

BINNES, M.—"Gas-containers for motor vehicles." No. 18,895.

BOORNE, W. H.—"Wet-carbonizing." No. 19,019.

COMPAGNIE POUR LA FABRICATION DES COMPTEURS ET MATÉRIEL D'USINES A GAZ.—"Water-gas producers." No. 18,757.

DRAKE, W. A., and DRAKES, LTD.—"Vertical retorts for manufacture of gas." No. 18,996.

GROCOTT, F. J.—"Furnaces for generating producer gas." No. 18,815.

JOLLY, J. C.—"Collapsible gasholders for motor vehicles." No. 18,762.

MAXTED, E. B.—"Synthesis of ammonia." No. 18,931.

NELSON, J.—"Low-temperature distillation of coal, shale, &c." No. 18,983.

THABERG, N. T.—"Producing gas from moist fuel in furnaces, gas-producers, &c." No. 18,911.

UNITED AUTOMOBILE SERVICES, LTD.—See Jolly. No. 18,762.

WALSTER, J. & S.—"Generating coal gas in retorts." No. 18,770.

WHITELEY, W.—"Gas-engines." No. 18,928.

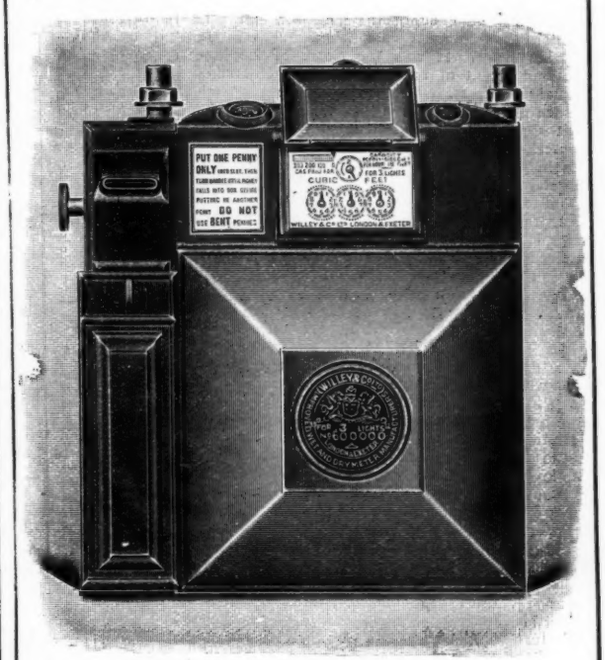
THREE POINTS

of advantage from the many found in our Slot Meters are:

1st.—They are Fraud Proof, and cannot be tampered with through the Slot.

2nd.—The Slot is closed when the maximum number of Coins have been inserted.

3rd.—Our Price-Changing System is the Simplest, Quickest, and most Accurate yet devised.



ALL PARTS INTERCHANGEABLE.

Tens of Thousands in use, and adopted exclusively by many Gas Companies.

WILLEY & CO., LTD.,

Exeter, London, Manchester, Leicester.

Telegrams:
"WILLEY, EXETER."
"GASVILLADO, KINLAND, LONDON."
"METERS, LEICESTER."
"WILMETER, MANCHESTER."

Telephone Nos.:
132 EXETER.
234 DALSTON, LONDON.
4777 LEICESTER.
7419 CITY (MANCHESTER).

LONDON WORKS & OFFICES:
89-95, Hertford Road, Kingsland, N.
LEICESTER:
5, Oxendon Street.
MANCHESTER:
John Street, Booth Street West, S.W.

AGENTS FOR SCOTLAND:

D. M. NELSON & CO., 20, WEST CAMPBELL ST., GLASGOW

Price of Gas at Bangor (co. Down).—At a meeting of the Bangor (co. Down) Urban District Council, Mr. Fegan gave notice of motion to rescind the order fixing the price of gas at 4s. 2d. per 1000 c.ft., and to make it 4s. 9d., as from to-day.

Sligo Public Gas Lighting.—In the High Court of Ireland, Dublin, Mr. Justice Moore, on the application of the Sligo Gas Company, granted liberty to issue executions for £375 18s. against the Sligo Corporation, in respect of the lighting of street-lamps.

Proposed Gas-Works Extensions at Coventry.—The Coventry Corporation Gas Committee have had before them a letter from the Ministry of Munitions stating that the Ministry would not be prepared to bear a portion of the cost of extending the coal-gas plant, and requesting the Corporation to refer to the Ministry any proposal for meeting the increased demand for gas in the future, which the Corporation anticipate will arise. The Committee, by resolution, expressed the opinion that there should be an enlargement of the coal-gas plant of a capacity of 2¼ million c.ft. per day, at an estimated cost of £166,700; and that the Manager (Mr. Fletcher W. Stevenson) be authorized to apply to the Ministry of Munitions for the necessary facilities for obtaining labour and material, and with regard to the raising of the money for capital expenditure, and to report further to the Committee at the next meeting.

Wages at Chelmsford.—Meter inspectors and collectors whose wages were raised by 2s. a week at the last meeting of the Chelmsford Town Council have now asked that the advance should be increased to 5s. a week. The stokers, yardmen, and fitters have requested a further all-round advance of 5s. a week.

Price Increased at Dorchester.—Owing to the increased cost of coal recently authorized by the Coal Control Board, and the still advancing costs of all other materials and labour, the Directors of the Dorchester Gas and Coke Company, Ltd., have been obliged to advance the price of gas 3d. per 1000 c.ft., making it 4s. 1d. net to ordinary consumers. Prepayment consumers will be proportionately affected.

Shortage of Gas Coal at Wilton.—The Gas Committee reported to the last meeting of the Wilton Town Council, that they had written to the Controller, asking him to allocate more gas coal to the Council's contractors, in order that the supply of gas in the borough might be kept up, and pointing out the necessity of closing the gas-works if the coal could not be obtained. The Mayor (Mr. C. E. Marks) said they suddenly ran very short of coal, and wondered why the supplies were not forthcoming; but apparently the quantity allotted to the merchants at Wilton had been reached. They were able to get some from the Salisbury Gas-Works, which helped to tide-over the difficulty.

STOCK MARKET REPORT.

THE Stock Exchange was open last week for two days only—Thursday and Friday. On Thursday, it had scarcely got into swing, for many absentees had not come back from their holidays. Therefore business was not abundant; but the tone was not unfavourable. The chief motive factor conducing thereto was domestic, and unconnected with war news, of which there was a dearth except from the Syrian front. It was the Bank of England announcement of reduced Treasury Bill rates equal to ⅜ p.ct. which brought about an advance in the prices of securities, especially the gilt-edged ones. Profiting thus, the 5 p.ct. and 4 p.ct. War Loans and Consols moved up, and Exchequer Bonds hardened. Home Rails had a good time—to some extent influenced by dividend expectations—and stock was scarce.

In the Foreign Market, French Loans were conspicuous for firmness, and Russians remained about stationary. In the Miscellaneous line, there was not much of interest; but Breweries were in demand, and Shipping was firm.

Business in the Gas Market was, of course, of the most meagre proportions, and few issues were dealt in at all. Prices, generally speaking, were much the same as the week before. In point of quotations, Commercial debenture rose a point; but all other changes were *ex div.* variations. An incident of the week interesting to gas shareholders was the demand for the Anglo-Persian Oil Company's new issue, which was subscribed three or four times over. The Money Market was disorganized by the Treasury action above mentioned.

Bargains done for cash during the week were as follows: On Thursday, Gas Light ordinary 67½, 67¾, 68, ditto maximum 57¾, ditto preference 71½, ditto debenture 55, Hornsey 115, Imperial Continental 89, South Metropolitan debenture 56⅞. On Friday, Commercial 4 p.ct. 70½, ditto 3½ p.ct. 64, ditto debenture 52½, Gas Light ordinary 67½, 67⅝, 68, Hastings and St. Leonards 50¼, 50¾, Imperial Continental debenture 66, 66½, Monte Video 8½, Primitiva preference 56s. 3d.

A comparative statement of the prices of all quoted issues now and a year ago will be found on p. 16.

Glasgow Gas Department Foremen's Association.—The fourth annual report of the Association, dealing with 1916-17, records the proceedings of a successful year. At the end of September the membership had reached 147, including three honorary members. Papers read during the year are printed in the report, which is thus of practical use to members.

Lurgan and the Maximum Price.—A public meeting in Lurgan protested against the Town Council's proposal to apply for a Provisional Order to empower them to increase the maximum price of gas from 4s. 6d. to 6s. 6d. per 1000 c.ft. Mr. A. Campbell said the Council had, no doubt, to face increased wages and cost of production; but it was strange that places with no such up-to-date plant as that possessed by Lurgan—which was claimed to be the finest in Ireland—could continue to sell gas at 4s. 6d., notwithstanding the higher price of coal. He held that the Council's move was engineered by some of the large ratepayers, and if once the price went up it would be kept up.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Share.	When ex-Dividend.	Ante-War Dividend & Bonus p.c.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
175,472	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	57—62	..
1,551,868	,,	April 8	2½	4¾%	Alliance & Dublin Ord.	59—64	52—57	..
374,000	,,	July 10	4	4%	Do. 4 p.c. Deb.	76—79	60—65	..
280,000	5	April 29	7½	3/6	Bombay, Ltd.	5⅞—6⅜	5—5½	..
50,000	10	Feb. 26	16	14%	Bourne-mouth Gas and Water { 10 p.c.	29—30	23—25	..
868,110	10	,,	7	7%	B 7 p.c.	15—15½	10½—11	..
115,000	10	,,	6	6/-	Pref. 6 p.c.	13¾—14	9—9½	..
159,740	—	—	—	4%	4 p.c. Deb.	..	67—69*	..
992,045	Stk.	Feb. 26	14	5¼%	Brentford A Consolid.	261—266	79—82	..
784,990	,,	,,	11	4¼%	Do. B New	204—209	76—79	..
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	81—86	..
221,400	,,	June 11	4	4%	Do. 4 p.c. Deb.	91—93	63—65	..
217,380	,,	Feb. 26	11	10%	Brighton & Hove Orig.	208—213	145—150	..
244,200	,,	,,	8	7%	Do. A Ord. Stk.	154—159	98—108	..
580,000	20	Mar. 26	12½	22/6	British	44—45	32—33	..
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk.	88—90	66—68*	..
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	51—54*	..
100,000	10	—	—	—	Cape Town & Dis., Ltd.	1½—2½	3—3½	..
100,000	10	—	—	4½%	Do. 4½ p.c. Pref.	4—6	6½—7½	..
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	58—63*	..
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	79—81	..
1,518,280	,,	Feb. 12	5/9/4	44/-	Commercial 4 p.c. Stk.	106—108	70—72	70½
560,000	,,	,,	5½	40/-	Do. 3½ p.c. do.	103—105	64—66	64
475,000	,,	June 11	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	52—54	52½
860,000	,,	,,	4	—	Continental Union Ltd.	76—79	39—41	..
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	61—63	..
278,400	—	—	—	11½%	Croydon B and C 7 p.c.,	..	165—175	..
—	—	—	—	10%	Do. E	..	..	..
492,270	Stk.	—	6	6⅛%	Derby Con. Stk.	123—125	95—100	..
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	80—83	..
1,009,180	10	July 29	10	5/0	European, Ltd.	17½—18	10—11	..
16,313,480	Stk.	Feb. 10	4/17/4	87/4	Gas Light and Coke { 4 p.c. Ord.	98—102	67—69	67½—68
2,600,000	,,	,,	3½	3½%	3½ p.c. max.	76—79	56—58	57⅞
4,022,235	,,	,,	4	4%	4 p.c. Con. Pref.	96—99	70—72	71½
4,674,850	,,	June 11	3	3%	3 p.c. Con. Deb.	72½—74½	54—56	55
180,000	,,	,,	10	10%	10 p.c. Bonds	..	..	..
258,740	,,	Mar. 12	5	3½%	Hastings & St. L. 3½ p.c.	87—89	48—53	£01—£03
70,000	10	April 29	11	6%	Hongkong & China, Ltd.	16½—16⅝	7⅞—8½	..
86,600	—	—	—	9%	Hornsey 7 p.c.	..	115—125	115
131,000	Stk.	Mar. 12	7½	7%	Ilford A and C.	151—154	92—97	..
85,780	,,	,,	6⅝	5⅝%	Do. B	115—118	72—77	..
65,500	,,	June 26	4	4%	Do. 4 p.c. Deb.	92—94	63—66*	..
4,940,000	,,	May 14	9	4½%	Imperial Continental	150—160	89—92	89
1,295,000	,,	Feb. 12	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	65—67	66—66½
235,242	,,	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	82—87	..
2,498,905	,,	Feb. 26	10	5%	Liverpool 5 p.c. Ord. { A / B	211—213 / 146—148	84½—85	..
806,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	71—73	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4¼—4⅝	3⅝—3¾	..
250,000	100	April 1	4½	4½%	Met. of Melbourne 4½ p.c. Deb.	99—101	89—100	..
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11½—12	8—8½	8½
1,875,892	Stk.	July 29	4½	4½%	Newcastle&Gatsh'dCon.	98⅛—99½	77½—78½	..
529,705	,,	June 26	3½	3½%	Do. 3½ p.c. Deb.	82—83	61—63	..
55,940	10	Feb. 26	7/14/0	7½%	North Middlesex 7 p.c.	14—15	9½—10½	..
300,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	102—104	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7⅝	2—3	..
60,000	50	Feb. 26	13	13%	Portsea, Island B	128—131	83—88	..
100,000	50	,,	12	11%	Do. C	118—121	73—78	..
52,000	50	,,	10	9%	Do. D	..	..	..
249,980	5	April 29	8	—	Primitiva Ord.	5⅜—6	1⅞—2	..
499,960	5	June 26	5	2/6	Do. 5 p.c. Pref.	4¼—5	2⅜—3	57/6
521,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91—93	76—78	..
—	—	—	—	4%	Do. ,, ,, 1911	..	..	..
346,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb.	85—87	57—62*	..
150,000	10	May 14	6	6/-	San Paulo { 6 p.c. Pref.	10¾—11	7¼—8	..
125,000	50	July 1	5	5%	5 p.c. Deb.	47—49	40—42	..
135,000	Stk.	Mar. 12	10	10%	Sheffield A	232—234	..	..
209,984	,,	,,	10	10%	Do. B	222—224	180—184	..
523,500	,,	,,	10	10%	Do. C	220—222		
90,000	10	May 28	9	6/-	South African	10½—11½	9—10	..
6,609,895	Stk.	Feb. 10	5/4/0	46/8	South Met. 4 p.c. Ord.	111—113	75—77	..
—	—	—	—	—	Do. Pref.	..	94—96	..
1,895,445	,,	July 10	3	3%	Do. 3 p.c. Deb.	72¾—74½	55—57	56⅞
224,820	,,	Feb. 26	8½	7½%	South Shields Con. Stk.	157—159	137—139	..
952,795	,,	,,	6	4¾%	S'th Suburb'n Ord. 5 p.c.	114—116	75—77	..
60,000	,,	,,	5	5%	Do. 5 p.c. Pref.	110—112	75—77	—
135,000	—	—	—	4½%	Do. West Kent	..	..	..
187,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116—118	84—86*	..
647,740	,,	May 14	5	5%	Southampton Ord.	99—102	75—77	..
120,000	,,	Feb. 12	7½	5½%	Tottenham and District { A 5 p.c.	135—138	93—97	..
782,275	,,	,,	6	4%	B 3½ p.c.	115—117	70—73	..
181,255	,,	June 26	4	4%	4 p.c. Deb.	87—89	61—63	..
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	60—65	..
236,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max.	103½—109½	89—91	..
30,000	,,	Feb. 26	8⅜	72/6	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	151—156	112—117	..
255,636	,,	,,	6⅜	57/6	Do. B 3½ p.c.	129—134	97—99	..
108,075	,,	,,	5/17/3	50/9	Do. C 3½ p.c.	110—115	84—89	..
352,900	,,	,,	6⅜	51/3	Wimbledon 5 p.c.	117—122	85—90	..
98,080	,,	,,	6⅜	57/6	Epsom 5 p.c.	121—126	93—98	..
88,416	,,	June 26	3	3%	3 p.c. Deb. Stk.	66—69	49—52*	..

* Ex Div.

Charge against a Slot-Meter Collector.

There was a long hearing at the Lytham Police Court, when James Whiteside was charged with thefts from prepayment meters. Mr. Forshaw, for the prosecution, said the Council gave prisoner a rise in wages, and put him to the work of collecting from slot-meters. On the other hand, Mr. Callis, who appeared for the defence, stated that Whiteside was a cripple, and that he was promoted to the "honourable" post of inspector, in which he had to read the ordinary meters, empty slot-meters, and do other work. He had to collect from £70 to £100 a week, at the age of 25, for 16s. a week. In April last, along with all the employees, his wages were raised 2s., with 2s. war bonus; so that he was getting £1 a week. Mr. W. Bennett (the Gas Manager) remarked that Whiteside had to make himself generally useful, and was paid according to his ability—physical or otherwise. The Chairman of the Bench (in sentencing prisoner to three months' imprisonment without hard labour) pointed out that, whatever opinions there might be as to the adequacy or otherwise of Whiteside's recompense, this was no justification for wrongdoing, against which society generally must be protected.

Irish Gas Prices.—The Cork Gas Consumers' Company have increased the price of gas 5d. per 1000 c.ft.; the consumption on stoves and heating apparatus to be charged at the same rate as for lighting purposes. The Queenstown Gas Company have fixed increased prices as follows: 5s. per 1000 c.ft. for engine supplies; 6s. for gas through ordinary meters; and 1d. per 13 c.ft. for gas sold through prepayment meters. The prices of gas in Maryborough have also been raised. In all instances the necessity for the increases is attributed to the higher charges for coal and materials, freight, and insurance.

Increased Price at Hastings.

Notice is given by the Hastings and St. Leonards Gas Company that, as from the Christmas readings of the meters, the price of gas will be advanced to 4s. 2d. per 1000 c.ft. The supply per prepayment meters will be varied in accordance. In making the announcement, Mr. C. F. Botley (the Engineer and General Manager) points out that, despite the increases heretofore in the price of gas, and the consequent reduction in the dividends paid, the cost of manufacture has so advanced that this further increase is absolutely unavoidable. During the last two or three months, fresh developments have arisen. In September, coal contracts were advanced 2s. 6d. per ton (equal to 3d. per 1000 c.ft.), and the war-time assistance now granted to employees represents (approximately) another 3d. While the use of gas and coke in preference to coal is in the national interests, economy in the use of gas is essential, and is welcomed by the management. Under present climatic conditions, and with the labour, plant, and material available, it is very difficult to produce the full quantity of gas required by consumers. These facts notwithstanding, it appears that the Committee of the Ratepayers' Association are concerned about the proposed Bill of the Company, seeking power to vary the sliding-scale arrangements. This the Association consider "is seriously opposed to the general interest;" and they hope the Town Council will associate themselves "with such opposition as may be expected to the proposal."

Morecambe Gas-Workers' Wages Advanced.—The Morecambe Corporation gas stokers, boiler attendants, machine drivers, coal heavers, and yardmen have applied for a further increase in rates of pay; and the following war bonuses were granted last week: Machine drivers, stokers, and boiler attendants, 3s. 9d. per week; coal heavers, 2s. per week; and yardmen 2s. 6d. per week.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

ENGINEER AND MANAGER. Brecon Gas Company. Applications by Jan. 17.
ASSISTANT CHEMIST. No. 6396.
STOKERS. Gravesend Gas-Works.
CARBONIZING FOREMAN. Ashford Gas Department.
BOILER AND EXHAUSTER MAN. No. 6394.

Appointment Wanted.

WORKS MANAGER. No. 6389.

Pitch Wanted. No. 6388.

Plant, &c. (Second-Hand) Wanted.

ROTARY GAS COMPRESSOR. No. 6397.

TENDERS FOR

Lighting Stores (Mantles, Burners, Lamps, Glass, &c.).

CALCUTTA CORPORATION. Tenders by March 4.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders to Alter or stop PERMANENT ADVERTISEMENTS should be received by the FIRST POST on Saturday.

Wanted, For Sale, and Tender Advertisements, Six Lines and under 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

United Kingdom: One Year, 23s. 6d.; Half Year, 12s.; Quarter, 6s. 6d. Payable in Advance. If credit is taken, an extra charge of 4s. a year is made.

Abroad (in the Postal Union): £1 7s. 6d., payable in advance.

In payment of subscriptions for "JOURNALS" sent abroad, Post Office Orders or Bankers' Drafts on London only are accepted.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C. 4.

Subscribers who desire to avail themselves of the reduction in the Subscription by paying in advance for the Year 1918 are reminded that this can only be done before the end of January.

Telegrams: "GASKING, FLEET LONDON." Telephone: Holborn 6857.

OXIDE OF IRON.

O'NEILL'S OXIDE
For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE.

SPENT OXIDE PURCHASED IN ANY DISTRICT

GAS PURIFICATION & CHEMICAL CO., LD., PALMERSTON HOUSE, OLD BROAD STREET, LONDON, E.C.

"VOLCANIC" FIRE CEMENT.
Resists 4,500° Fahr. Best for Gas-Works.
ANDREW STEPHENSON, Gresham House, Old Broad Street, LONDON, E.C. "Volcanism, London."

BRITISH GAS PURIFYING MATERIAL.

ENGLISH BOG ORE AND NATURAL HYDRATED OXIDE OF IRON.
SPENT OXIDE BOUGHT.

BRITISH GAS PURIFYING MATERIALS CO., LTD.
(W. T. P. CUNNINGHAM, Chief Proprietor and Managing Director.)
13, ARCADIAN GARDENS, WOOD GREEN, LONDON, N. 22.
Telegrams: "Bripurimat, Wood, London." 'Phone: Palmer's Green 608.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, London, S.E. 1.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 815 Oldham, and 2412 Hop, London.
Telegrams—
"BRADDOCK, OLDHAM," and "METRIQUE, LAMB LONDON."

BENZOL PLANTS FOR GAS-WORKS.

BAGLEY, MILLS, & Co., Ltd., 92, Victoria Street, Westminster, S.W., invite inquiries from all gas-works making 75 million cubic feet and upwards per annum.
See Illustrated Advertisement Feb. 26, p. III. of Centre.

NEWBURN, ELLIS, AND PRYOR.

CHARTERED PATENT AGENTS AND TRADE MARK AGENTS,
70, Chancery Lane, London.
Telegrams: "Patent London." 'Phone: 243 Holborn.
And 8, St. Nicholas Buildings, Newcastle-on-Tyne.

SOUTH WALES TAR COMPANY,
MARESTOWNMER, near CARDIFF.

TAR WANTED.—Best Prices paid either at fixed Rate or Profit-Sharing Basis.

OXIDE OF IRON.
SPENT OXIDE WANTED.

BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Avenue 6680.

"TORTO" FIRE CEMENT.

BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Avenue 6680.

"KLEENOFF," THE COOKER CLEANSER.
Tins for sale to Consumers.
In Bulk for Works Use.

BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Avenue 6680.

SEND your inquiries for Carburetted HYDROGEN AND BLUE WATER-GAS PLANT, also TAR DEHYDRATING PLANT and other GAS-WORKS APPARATUS to—
BALE AND HARDY,
39, VICTORIA STREET, WESTMINSTER, S.W. 1.

SPENCER'S Patent Inclined HURDLE GRIDS.

THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement, Nov. 27, p. 427.

ROBERT DEMPSTER & SONS, Ltd., Contractors for Complete CARBONIZING PLANTS and every Description of GAS APPARATUS, ELEVATING, CONVEYING, and TELPHERAGE PLANTS, also STOKING MACHINERY, ROSS MOUNT IRONWORKS, ELLAND.

ALDER AND MACKAY, LTD. (ESTABLISHED 1850.)

WET AND DRY METERS, SLOT AND ORDINARY.

STREET LAMPS AND AUTOMATIC CONTROLLERS.

EDINBURGH.

SULPHURIC ACID.

SPECIALLY prepared for the manufacture of SULPHATE OF AMMONIA.

SPENCER CHAPMAN & MESSEL, LTD., with which is amalgamated WM. PEARCE & SONS, LTD. Mark Lane, LONDON, E.C. Works—SILVERTOWN. Telegrams—"HYDROCHLORIC, FEN, LONDON." Telephone—1588 AVENUE (3 lines).

SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in connection with Sulphate Plants. We Guarantee promptness with efficiency for Repairs.

JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON. Telegrams—"SATURATORS BOLTON." Telephone 0848.

"FERROX." "FERROX." "FERROX."

A BRITISH Oxide Cheaper and Better than Bogore. 85 per cent. Water, 75 per cent. Ferric Hydrate. For Sale outright or on Loan. OXIDE LIMITED, Brentford, MIDDLESEX.

J. E. C. LORD, Ship Canal Tar-Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

GAS-WORKS requiring Extensions should Communicate with FIRTH BLAKELEY, SONS, AND CO., LIMITED, Dewsbury, who make a Speciality of Catering for the Smaller Gas Concerns. Prices Reasonable; quality and results, the best. Satisfaction Guaranteed.

WORKS Manager of a Gas Company (Output 60 Million c.ft.) with Charge of Distribution, SEEKS CHANGE. Age 42. Seventeen Years' Experience. Good Business Abilities, Engineering Knowledge, and Excellent References. Address No. 6389, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

BRECON GAS COMPANY.

THE Directors of the Gas Company at Brecon (South Wales) invite Applications for the Position of ENGINEER AND MANAGER of their Works, including Charge of the Distribution and Fittings Departments. Normal annual make, over 30 Millions. Applications, stating Age, Experience, names of References, and Salary required (inclusive of house rent), should reach the CHAIRMAN, Gas Offices, BRECON, not later than Thursday, Jan. 17.

ASSISTANT Chemist required for Tar-Works Laboratory in Metropolitan Area. Apply, by letter, stating Salary, &c., to No. 6396, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

ASHFORD URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

CARBONIZING Foreman required immediately. Capable of taking Sole Control of Retort-House, &c. Applications, stating Age, Experience, and Remuneration required, to be sent to the undersigned as early as possible.

H. R. TURNER, Engineer and Manager.

Gas Offices, Ashford, Kent.

WANTED, Boiler and Exhauster MAN, for Gas-Works making about 200 Million cubic feet per Annum. West Riding of Yorkshire. Apply, by letter, stating Wages required, to No. 6394, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

WANTED, at once, several Stokers to augment present men. Shovel Charging. Wages 7s. 6d. per Shift of Twelve Hours and Pay-and-a-Half for Sunday day work when working. Coal handled, 3 tons 3 cwt. per Shift. Cokemen provided. Apply to J. DAVIS, Engineer, Gas-Works GRAVESEND.

WANTED.—Offers of Pitch, from Makers only, for Prompt and Forward Delivery, stating Price and Quantity. Address, No. 6388, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

WANTED, Second-Hand, 5000 Cubic Feet Capacity per Hour ROTARY GAS COMPRESSOR, Steam Driven, with all necessary Valves, Bye-Pass, and Connections. Send full Particulars and Prices to No. 6397, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

PURIFIERS for Sale.—Set of Four, 15 ft. square. Complete with Travelling Lifting Gear, Valves, and Connections. Cheap before removal. FIRTH BLAKELEY, SONS, AND CO., LTD., Church Fenton, LEEDS.

GAS PLANT for Sale.—We can always offer New and Second-Hand Gas Apparatus, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere. FIRTH BLAKELEY, SONS, AND CO., LTD., CHURCH FENTON, near LEEDS.

CORPORATION OF CALCUTTA.

NOTICE TO CONTRACTORS.

LIGHTING STORES FOR THE YEAR 1918-19.

TENDERS are invited, in duplicate, for the Supply of LIGHTING STORES for Public Street Lamps and Municipal Institutions for Twelve Months from 1st of April, 1918.

Complete Specification and Descriptive List of Stores required, together with Tender Form, in duplicate, may be obtained from the Central Record-Keeper, Central Municipal Office Buildings, Calcutta, on payment of Rs. 2 only.

The following is a brief summary of the Principal Articles required:—

(a) Inverted Incandescent GAS-MANTLES for Street Lighting.
(b) Inverted Incandescent GAS-BURNERS complete.
(c) GLASS CYLINDERS for Inverted Burners.
(d) GLASS PANES for Street Lamps.
(e) MAGNESIA NOZZLES for Inverted Burners.
(f) INVERTED INCANDESCENT GAS ARC LAMPS.

Samples are required where stated in the List, and these must be addressed to the Lighting Superintendent to the Corporation, 33 & 34, Wellington Street, Calcutta, carriage paid.

Tenders must include Delivery Free of all Charges at the Corporation Stores, Calcutta, including Duty and Insurance against Breakages. War Risk Insurance and extra Freight Charges (if any) to be separately stated.

The Corporation do not bind themselves to accept the lowest or any Tender, and will be at liberty to accept the whole or part of a Tender.

Tenderers may quote for any or all of the items mentioned in the list.

Payment will be made when Delivery is accepted.

Tenders must be addressed to, and will be received by, the Deputy-Chairman of the Corporation, up to 2 p.m. on Monday, the 4th of March, 1918, when they will be opened in the presence of such Tenderers as may be present. Each Tender, in Duplicate, must be enclosed in a Sealed Cover, and superscribed "Tender for Lighting Stores."

No Tender will be considered unless accompanied by a remittance to the extent of 2½ p.ct. on the total value of such Tender.

Tenderers must abide by the rules in regard to Tenders in vogue in the Corporation, and are required to submit Tenders in Duplicate on the Corporation Form above referred to.

C. C. CHATTERJEE, Secretary to the Corporation.

Municipal Office, Nov. 12, 1917.

THE GAS LIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the TRANSFER BOOKS of this Company, SO FAR AS THEY RELATE TO CAPITAL STOCKS, WILL BE CLOSED at Four o'clock p.m., on Tuesday, the 8th day of January next, and will be RE-OPENED immediately after the Ordinary General Meeting of the Company to be held on Friday, the 8th day of February next.

By order, HERBERT EDWARD IBBS, Acting Secretary.

Chief Office: Horseferry Road, Westminster, S.W. 1. Dec. 24, 1917.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MESSRS. A. & W. RICHARDS beg to notify that their SALES BY AUCTION of NEW CAPITAL ISSUED UNDER PARLIAMENTARY POWERS, and of STOCKS and SHARES belonging to EXECUTORS and other PRIVATE OWNERS in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES, take place PERIODICALLY at THE MART, TOKENHOUSE YARD, E.C. Terms for Issuing New Capital, and also for including other Gas and Water Stocks and Shares in these Periodical Sales, will be forwarded on Application to Messrs. A. & W. RICHARDS, at 57, WALBROOK, E.C.

CARBURINE FOR GAS ENRICHING

ALSO

THE MAXIM PATENT CARBURETTOR.

For Prices, &c., apply to

The GAS LIGHTING IMPROVEMENT CO., Ltd., SALISBURY HOUSE, LONDON WALL, E.C.

Telephones: 4451, 4452, 4453, and 4454 London Wall.

Telegraphic Address: "Carburine, London."

TROTTER, HAINES, & CORBETT, LIMITED.

BRETTEL'S ESTATE,

FIRE-CLAY & BRICK WORKS,

STOURBRIDGE.

Manufacturers of GAS RETORTS, GLASSHOUSE-FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every Description of FIRE BRICKS.

Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.

SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: E. C. BROWN & Co., LEADENHALL CHAMBERS, 4, ST. MARY AXE, E.C.

HIGH-PRESSURE DISTRIBUTION

GAS DISTRIBUTION LIMITED

(Late HELM LAMP COMPANY)

can supply

Everything except the Gas.

WELDED JOINTS ARE OUR SPECIALITY.

Queen's Buildings, NUNEATON.

R. LAIDLAW & SON (EDIN.) LTD.

GAS METER MAKERS.

ORDINARY & PREPAYMENT METERS

REPAIRS AND CONVERSION OF ORDINARY TO PREPAYMENT METERS RECEIVE PROMPT ATTENTION.

LONDON & EDINBURGH.

JOHN HALL & CO. OF STOURBRIDGE LIMITED,

STOURBRIDGE,

Manufacturers of

FIRE-BRICKS, LUMPS, TILES,

GAS RETORTS,

And every description of Fire-Clay Goods.

RETORTS CAREFULLY PACKED FOR SHIPMENT.

TELEPHOS

NO BY-PASS

COMPLETE SETS

FROM **11/6** SUBJECT.

NEW **1914** MODELS

Apply for New Catalogue to:—

"TELEPHOS"

16/20, Farringdon Avenue, E.C.

BRITISH MADE.

GAS SWITCH